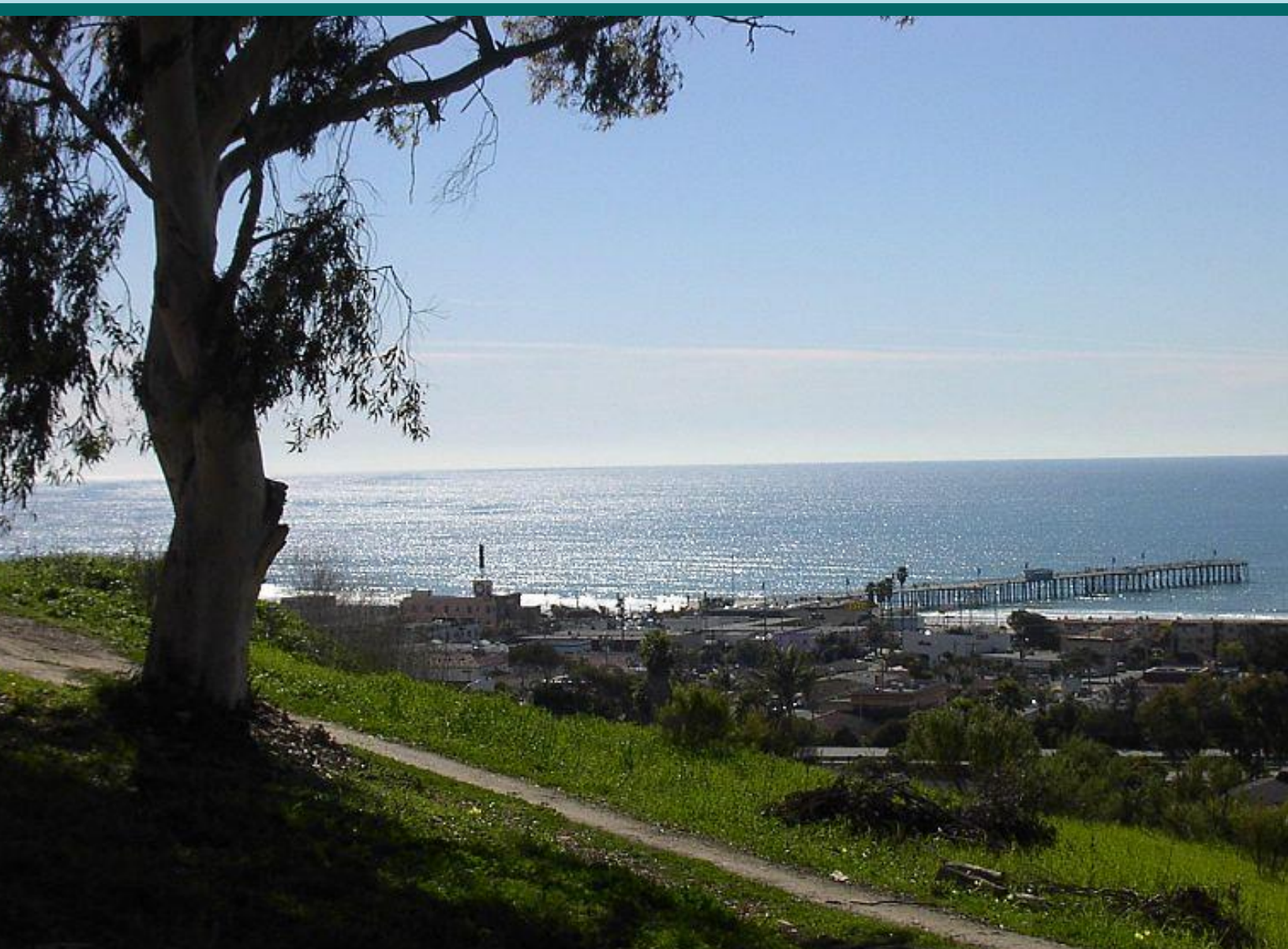
CITY OF PISMO BEACH

DRAFT CLIMATE ACTION PLAN

November 2013



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City of Pismo Beach
Draft Climate Action Plan

November 2013

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City of Pismo Beach

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Appendix A: GHG Emissions Inventory
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Acronyms

AB	Assembly Bill
APCD	San Luis Obispo County Air Pollution Control District
Cal/EPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CAFE	Corporate Average Fuel Economy
CAP	Climate Action Plan
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
EPA	Environmental Protection Agency
GHG	Greenhouse gas
HFC	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt hours
LCFS	Low Carbon Fuel Standard
LED	Light-Emitting Diode
MPO	Metropolitan Planning Organization
MT	Metric tons
N_2O	Nitrous oxide
O_3	Ozone
PFCs	Perfluorocarbons
PG&E	Pacific Gas and Electric
PV	Photovoltaic
RTA	Regional Transit Authority
SB	Senate Bill
SLOCOG	San Luis Obispo Council of Governments
TDM	Transportation demand management
VMT	Vehicle miles traveled

EXECUTIVE

SUMMARY

Executive Summary

The City of Pismo Beach Climate Action Plan (CAP) is a long-range plan to reduce greenhouse gas (GHG) emissions from City government operations and community activities within Pismo Beach and prepare for the anticipated effects of climate change. The CAP will also help achieve multiple community goals such as lowering energy costs, reducing air pollution, supporting local economic development, and improving public health and quality of life. Specifically this CAP is designed to:

- Benchmark Pismo Beach's 2005 baseline GHG emissions and 2020 projected emissions relative to the statewide emissions target established under California Assembly Bill (AB) 32.
- Provide a roadmap for achieving the City's GHG emissions reduction target of 10 percent below 2005 levels by the year 2020 and help Pismo Beach prepare for anticipated climate change impacts.
- Serve as a comprehensive plan for addressing the cumulative impacts of GHG emissions within Pismo Beach (see California Environmental Quality Act [CEQA] Guidelines, Section 15183.5, and the San Luis Obispo County Air Pollution Control District [APCD] CEQA Air Quality Handbook, Sections 3.3 and 4.6).
- Support tiering and streamlining the analysis of GHG emissions for future projects within Pismo Beach pursuant to State CEQA Guidelines Sections 15152 and 15183.5.

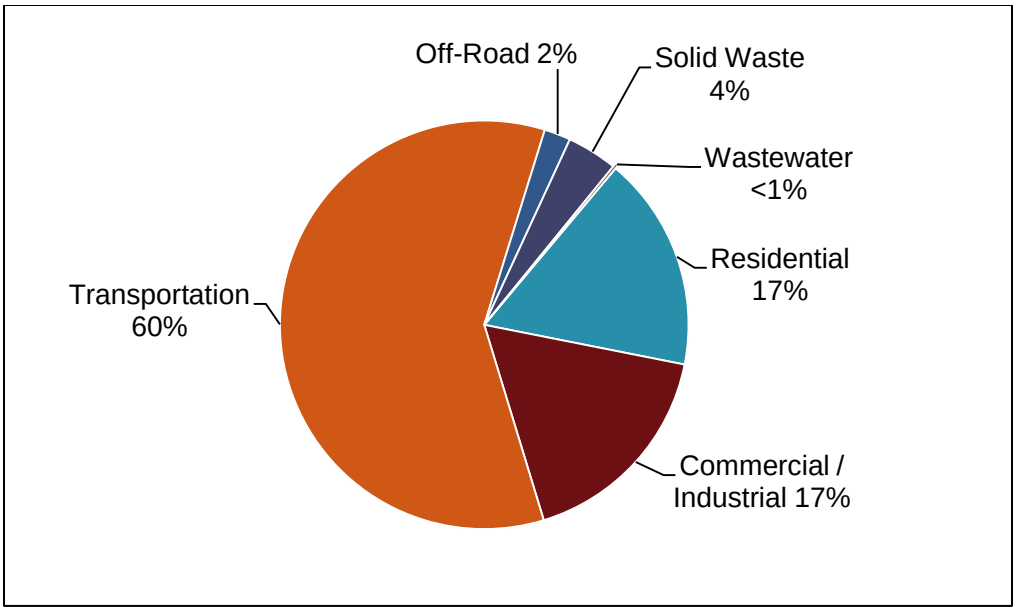
Pismo Beach's GHG Emissions

The *City of Pismo Beach 2005 Greenhouse Gas Emissions Inventory Update* (2013) (GHG Emissions Inventory) was prepared to identify the major sources and quantities of GHG emissions produced in Pismo Beach in 2005 and forecast how these emissions may change over time. The GHG Emissions Inventory provides a baseline against which the City can measure its progress in reducing GHG emissions over time. It also provides information on the scale of emissions from various sources and where the opportunities to reduce emissions lie.

According to the GHG Emissions Inventory, in 2005, the Pismo Beach community emitted approximately 87,077 metric tons of carbon dioxide equivalent GHG emissions (MT CO_2e), as a result of activities that took place within the transportation, residential energy use, commercial and industrial energy use, off-road vehicles and equipment,[1] solid waste, and wastewater sectors. As shown in **Figure ES-1**, the largest contributors of GHG emissions were the transportation (60 percent), commercial/industrial energy use (17 percent), and residential energy use (17 percent) sectors. The remainder of emissions resulted from the solid waste (four percent), off-road (two percent) and wastewater (less than one percent) sectors.

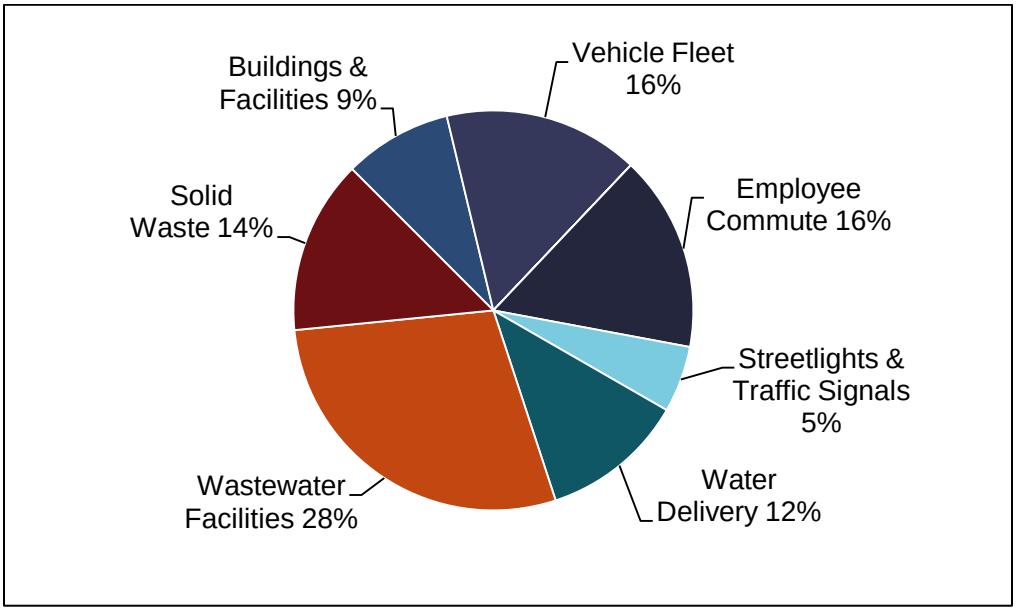
[1] The off-road vehicles and equipment sector includes GHG emissions resulting from gasoline, diesel, and compressed natural gas fuel used to power lawn and garden equipment, construction vehicles and equipment, agricultural vehicles and equipment, light commercial equipment and industrial equipment.

Figure ES-1: Community-wide GHG Emissions by Sector (2005)



The GHG Emissions Inventory also analyzed emissions from City government operations and facilities. The City government operations inventory is a subset of the community-wide inventory, and is included within the community-wide inventory. In 2005, City government operations generated approximately 1,897 MT CO_2e. This quantity represents approximately two percent of Pismo Beach's total community-wide GHG emissions. As shown in **Figure ES-2**, the majority of these GHG emissions resulted from the City's wastewater facilities (28 percent), employee commute (16 percent), vehicle fleet (16 percent), and solid waste (14 percent).

Figure ES-2: City Government Operations GHG Emissions by Sector (2005)



A GHG emissions forecast is a projection of how GHG emissions would change in the future with projected changes in population and jobs.[2] The "business-as-usual forecast" projects how GHG emissions would change in the year 2020 if consumption trends and behavior continue as they did in 2005, absent of any new policies or actions that would reduce emissions. The year 2020 was selected for the forecast in order to maintain consistency with AB 32.

Under the business-as-usual forecast, Pismo Beach's GHG emissions are projected to grow approximately 39 percent above 2005 GHG emissions levels by the year 2020, from 87,077 MT CO_2e to 120,801 MT CO_2e. Emissions associated with the transportation sector will experience the highest level of growth (60 percent). Emissions for the other sectors will range from a decrease of eight percent to an increase of 26 percent. **Table ES-1** shows the forecast results of the business-as-usual scenario.

Table ES-1: 2020 Business-As-Usual GHG Emissions Forecast

Sector	2005 (MT CO_2e)	2020 (MT CO_2e)	Percent Change from 2005 to 2020
Transportation	51,811	82,794	60%
Commercial / Industrial	14,958	18,775	26%
Residential	14,808	13,664	-8%
Solid Waste	3,479	3,210	-8%
Wastewater	200	184	-8%
Off-Road	1,821	2,174	19%
Total	**87,077**	**120,801**	**39%**

The *AB 32 Climate Change Scoping Plan* (2008) (AB 32 Scoping Plan), prepared by the California Air Resources Board (CARB) pursuant to AB 32, identifies several State regulations that will reduce GHG emissions within Pismo Beach. These State regulations require no additional local action. In addition, the City of Pismo Beach has completed a number of local actions since the 2005 baseline inventory year that will reduce the community's GHG emissions. Therefore, these measures were incorporated into the forecast and reduction assessment to create an "adjusted forecast scenario," which provides a more accurate forecast scenario from which to build the CAP.

As shown in **Table ES-2**, state and local measures will reduce GHG emissions in Pismo Beach by an estimated 25,019 MT CO_2e in 2020. Under the adjusted forecast scenario, 2020 GHG emissions are projected to decrease to 95,782 MT CO_2e (approximately 21 percent lower than the business-as-usual scenario of 120,801 MT CO_2e).

[2] Population and job projections for the year 2020 were obtained from the San Luis Obispo Council of Governments (SLOCOG) 2040 Population, Housing & Employment Forecast (August 2011) (see Chapter 2).

Table ES-2: Summary of Reductions from State and Local Measures and 2020 GHG Emissions

	GHG Emissions (MT CO_2e)
2020 Business-as-Usual Forecast	120,801
2020 Reduction from State Measures	-24,777
2020 Reduction from Local Measures	-242
Total Reduction from State and Local Measures	**-25,019**
2020 Adjusted Forecast	**95,782**

GHG Emissions Reduction Target

The City is committed to reducing its GHG emissions to the extent feasible in a manner consistent with State legislative policy as set forth in AB 32. As such, the City has selected a target of 10 percent below 2005 levels by 2020 (see Chapter 2, Section 2.3). As shown in **Table ES-3**, based on the 10 percent reduction target, Pismo Beach would need to reduce its community-wide GHG emissions to 78,369 MT CO_2e by 2020. To meet this target, Pismo Beach will need to reduce its GHG emissions 18 percent below the adjusted forecast level (equivalent to 17,413 MT CO_2e) by 2020 through the implementation of local measures and actions identified in this plan.

Table ES-3: Pismo Beach's GHG Emissions, Target, and Reduction Necessary to Meet Target

	GHG Emissions (MT CO_2e)
2005 Baseline Emissions	87,077
2020 Adjusted Forecast	95,782
Target (10% below 2005 levels by 2020)	78,369
Remaining Gap Necessary to Meet Target	**17,413**

Climate Action Measures

To achieve the City's target and prepare for the anticipated effects of climate change, the CAP identifies climate action measures. These measures are organized into the following focus areas: City government operations, energy, transportation and land use, off-road vehicles and equipment, solid waste, and tree planting. The measures were selected based on careful consideration of the resulting emission reductions, the distribution of emissions revealed in the GHG Emissions Inventory, existing priorities and resources, policies and strategies of neighboring jurisdictions and regional agencies, and the potential costs and benefits of each measure. Collectively, the measures identified in the CAP have the potential to reduce GHG emissions within Pismo Beach by 17,676 MT CO_2e in 2020 and meet the City's reduction target.

Implementation and Monitoring

Implementation and monitoring are essential processes to ensure that Pismo Beach reduces its GHG emissions and meets its target. To facilitate this, each climate action measure identifies implementation actions, departments responsible for implementation and monitoring, cost and savings estimates, the GHG reduction potential, a performance indicator to monitor progress, and an implementation time frame. Measure implementation is separated into three phases: near-term (by 2015), mid-term (2016-2017), and long-term (2018-2020).

In order to ensure that measures are implemented and their progress is monitored, upon adoption of the CAP, the City will establish a CAP Coordinator who will provide essential CAP oversight and coordination of a multi-departmental CAP Implementation Team comprised of key staff in each selected department. The CAP Implementation Team will meet at least one time per year to assess the status of CAP efforts. The City's CAP Coordinator will be responsible for developing an annual progress report to the City Council that identifies the implementation status of each measure, evaluates achievement of or progress toward performance indicators (where applicable), assesses the effectiveness of various measures and actions included in the CAP, and recommends adjustments to measures or actions, as needed. To evaluate the performance of the CAP as a whole, the City will update the community and City government GHG emissions inventories every five years, using the most up-to-date calculation methods, data, and tools.

CHAPTER 1

INTRODUCTION

1.0 Introduction

Although climate change is a global issue, the State of California recognizes that it poses risks to the public health, environment, economic well-being, and natural resources of California, and has taken an active approach to address climate change through the adoption of legislation and policies. In 2005, the governor issued Executive Order S-3-05 to reduce statewide GHG emissions to 1990 levels by 2020 and to 80 percent below 1990 levels by 2050. Enactment of several related pieces of climate action legislation followed, including AB 32 (the Global Warming Solutions Act of 2006), which codified the 2020 target, and SB 97 (the CEQA and GHG Emissions bill of 2007), which requires lead agencies to analyze GHG emissions and mitigate climate change impacts under CEQA. These laws together create a framework for GHG emissions reductions and identify local governments as having a vital role to play in assisting the State in meeting these mandates.

Recognizing the important role and responsibility that local governments have in reducing GHG emissions and mitigating their potential GHG impacts, the City has prepared this CAP. This chapter describes the purpose, scope, and content of Pismo Beach's CAP. This chapter also summarizes the scientific and regulatory framework under which this plan has been developed.

1.1 Purpose and Scope

The City's CAP is a long-range plan to reduce GHG emissions from community-wide activities and City government operations within Pismo Beach to support the State's efforts under AB 32 and to mitigate the community's contribution to global climate change. Specifically, the CAP does the following:

- Summarizes the results of the *City of Pismo Beach 2005 Greenhouse Gas Emissions Inventory Update*, which identifies the major sources and quantities of GHG emissions produced within Pismo Beach and forecasts how these emissions may change over time.
- Identifies the quantity of GHG emissions that Pismo Beach will need to reduce to meet its emissions target of 10 percent below 2005 levels by the year 2020, in support of in support the State of California's emissions reduction target.
- Sets forth City government and community-wide GHG reduction measures, including performance standards which, if implemented, would collectively achieve the City's emission reduction target.
- Identifies proactive strategies that can be implemented to help Pismo Beach prepare for anticipated climate change impacts.
- Sets forth procedures to implement, monitor, and verify the effectiveness of the CAP measures and adapt efforts moving forward as necessary.

In addition to reducing Pismo Beach's GHG emissions consistent with AB 32 and mitigating the community's contribution to global climate change, implementation of the CAP will help achieve multiple community-wide goals, such as lowering energy costs, reducing air pollution, supporting local economic development, and improving public health and quality of life. The CAP may also be utilized to tier and streamline the analysis of GHG emissions of future development within Pismo Beach pursuant to State CEQA Guidelines Sections 15152 and 15183.5 (refer to Section 1.4, *Relationship to CEQA*).

1.2 Content

The CAP is organized into the following chapters:

1.0 Introduction – describes the purpose, scope, and content of Pismo Beach's CAP. It also summarizes the scientific and regulatory framework under which this plan has been developed.

2.0 GHG Emissions and Reduction Target – identifies the sources of GHG emissions in Pismo Beach, quantifies emissions for a baseline year (2005), and forecasts how emission levels would change through 2020. This chapter also quantifies the GHG emissions reduction target for the year 2020.

3.0 Climate Action Measures – organizes the CAP measures into the following focus areas: City government operations, energy, transportation and land use, off-road vehicles and equipment, solid waste, and tree planting. Each GHG reduction measure is presented with implementation actions, estimated GHG reductions in 2020, and estimated cost and future savings.

4.0 Adaptation – includes a discussion of modeled climate change predictions, an urban system assessment, a vulnerability assessment, and adaptation measures to prepare for and minimize the risk associated with anticipated climate change impacts.

5.0 Implementation and Monitoring – sets forth procedures to implement and monitor the individual CAP measures, evaluate the CAP's performance, and amend the plan if it is not achieving targeted reduction levels. It also identifies potential sources of funding to implement the CAP.

1.3 Background and Planning Process

In 2007, the San Luis Obispo County Air Pollution Control District (APCD) convened a committee of agency stakeholders (Stakeholder Committee) from the cities of Atascadero, Arroyo Grande, Grover Beach, Morro Bay, Paso Robles, Pismo Beach, and San Luis Obispo and the County of San Luis Obispo to initiate a discussion on climate change, including science, policy, funding, mitigation, adaptation, and public engagement. The APCD also coordinated the preparation of GHG emissions inventories for each of the jurisdictions. Both the City and County of San Luis Obispo received federal stimulus funds to support the development of their CAPs. San Luis Obispo County approved its EnergyWise Plan in November 2011, and the City of San

Luis Obispo adopted its Climate Action Plan in July 2012. The APCD worked with the remaining six cities to secure funds for individual CAPs, including the City of Pismo Beach CAP, through the Pacific Gas and Electric Company (PG&E) Green Communities Program, Southern California Gas Company (SoCalGas), and APCD's mitigation grant funding.

City staff and its consultants worked with members of the community and elected officials to develop the CAP. The public outreach program involved two community workshops that introduced the project gathered input and ideas for the document and on potential GHG reduction measures. A virtual town hall also provided an opportunity for community members to evaluate a preliminary set of GHG reduction measures and suggest additional ideas. Public outreach also included posting project information and updates to the project website (www.centralcoastghgplanning.com) and eNewsletter announcements. Public comment was also considered during Planning Commission and City Council meetings.

1.4 Relationship to CEQA

According to the California Natural Resources Agency (2009) and the State's Office of the Attorney General (2009), GHG emissions may be best analyzed and mitigated at the programmatic level (i.e., in a GHG reduction plan/CAP). In 2009, the California Natural Resources Agency amended the State CEQA Guidelines to add a new provision, Section 15183.5, which provides a framework for programmatic GHG emissions reduction plans (i.e., a CAP). Section 15183.5 states a plan for the reduction of GHG emissions should:

- Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
- Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable;
- Identify and analyze the GHG emissions resulting from sources in the community;
- Identify a suite of specific, enforceable measures that, collectively, will achieve the emissions targets;
- Establish a mechanism to monitor the plan's progress and to require amendment if the plan is falling short; and
- Be adopted in a public process following environmental review.

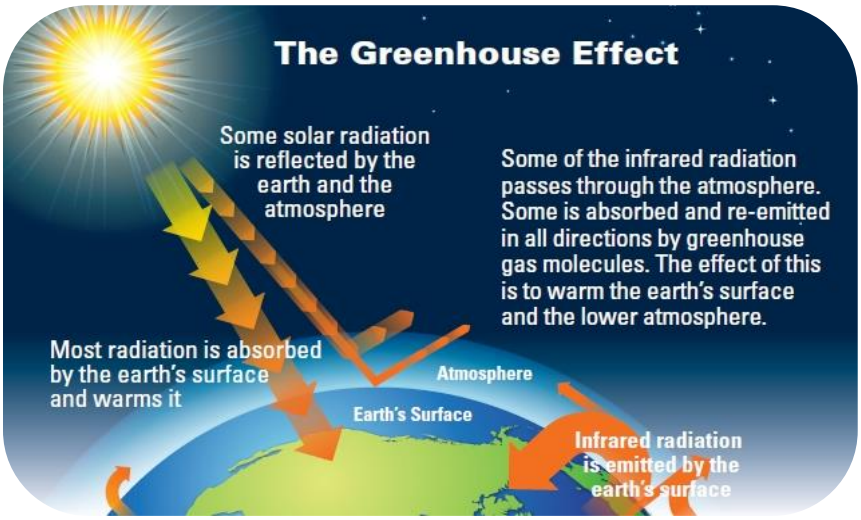
This CAP was developed to be consistent with State CEQA Guidelines Section 15183.5. Once the CAP is adopted following environmental review, a lead agency may determine that projects that are consistent with the CAP will not have significant GHG-related impacts, thereby shortening the CEQA process, which can save time and money for these projects. **Appendix C** contains a worksheet that project applicants may use to demonstrate project-level compliance. If a project is found to be inconsistent with the CAP, the APCD thresholds discussed in Section 1.8.3 should be applied.

1.5 Scientific Background

In order to make meaningful and effective decisions regarding the mitigation of GHG emissions and adaptation to anticipated changes in climate, it is important to understand the science under which this CAP has been developed. This section provides a brief introduction to the scientific research efforts to understand how climate change occurs and its implications.

Global climate change refers to changes in the average climatic conditions on Earth as a whole, including changes in temperature, wind patterns, precipitation, and storms. Global warming, a related concept, is the observed increase in average temperature of the Earth's surface and atmosphere caused by increased GHG emissions, which can contribute to changes in global climate patterns. GHGs, such as water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and ozone (O_3), are gases in the Earth's atmosphere that play a critical role in determining the Earth's surface temperature. Specifically, GHGs allow high-frequency solar radiation to enter the Earth's atmosphere, but trap the low frequency, long wave energy which is radiated back from the Earth to space, resulting in a warming of the atmosphere. The trapping of heat at the Earth's surface is known as the "greenhouse effect" (refer to **Figure 1-1**).

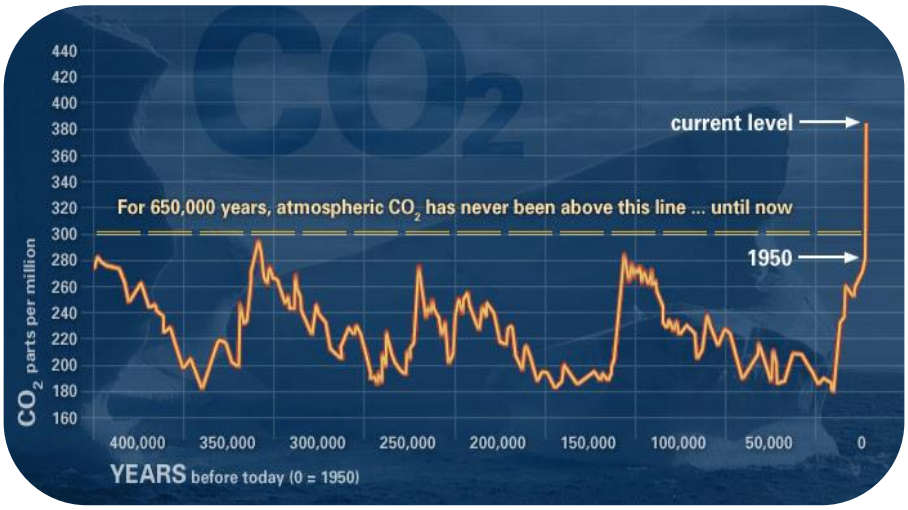
Figure 1-1: The Greenhouse Effect


The Greenhouse Effect
Some solar radiation is reflected by the earth and the atmosphere
Some of the infrared radiation passes through the atmosphere. Some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the earth's surface and the lower atmosphere.
Most radiation is absorbed by the earth's surface and warms it
Atmosphere
Earth's Surface
Infrared radiation is emitted by the earth's surface

Source: National Oceanic & Atmospheric Administration (NOAA), 2009

GHGs are the result of both natural and anthropogenic activities. The consumption of fossil fuels for power generation and transportation, forest fires, decomposition of organic waste, and industrial processes are the primary sources of GHG emissions. Without human intervention, the Earth maintains an approximate long-term balance between the emission of GHGs into the atmosphere and its storage in oceans and terrestrial ecosystems. Following the industrial revolution, however, increased combustion of fossil fuels (e.g., gasoline, diesel, coal, etc.) and other industrial processes have contributed to the rapid increase in atmospheric levels of GHGs (refer to **Figure 1-2**) (NOAA, 2009). This increase in GHGs correlates with the recent increase in global average temperature (which has risen approximately 1.4°F since the early 20th century) (IPCC, 2007; NOAA, 2009).

Figure 1-2: Historic Fluctuations and Recent Increases in Atmospheric Carbon Dioxide



This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO_2 has increased since the Industrial Revolution (NASA, 2011).

The principal GHGs that enter the atmosphere as a result of human activities are discussed below.

- **Carbon dioxide (CO_2)** is released into the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., cement production) and deforestation. Carbon dioxide is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- **Methane (CH_4)** is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from agricultural practices, such as the raising of livestock, and by the decomposition of organic waste in landfills.
- **Nitrous oxide (N_2O)** is emitted during agricultural and industrial activities, as well as during the burning of fossil fuels and solid waste.
- **Fluorinated gases** (i.e., hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) are synthetic GHGs that are emitted from a variety of industrial processes (e.g., aluminum production) and used in commercial, industrial, and consumer products (e.g., automobile air conditioners and refrigerants). These gases are typically emitted in smaller quantities, but because they are potent GHGs, they are sometimes referred to as "high global warming potential" gases.

Each GHG has a different potential for trapping heat in the atmosphere, called global warming potential. For example, one pound of methane has 21 times more heat capturing potential than one pound of carbon dioxide. To simplify reporting and analysis of GHGs, GHG emissions are typically reported in metric tons of carbon dioxide equivalent (MT CO_2e) units. When dealing with an array of emissions, the gases are converted to their carbon dioxide equivalents for

comparison purposes. The global warming potentials for common GHGs are shown in **Table 1-1**.

Table 1-1: Global Warming Potential of GHGs

GHG	Global Warming Potential
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310
Hydroflourocarbons (HFCs)	140-11,700
Perflourocarbons (PFCs)	6,500-9,200
Sulfur Hexaflouride (SF_6)	23,900

Notes: Each of the GHGs listed above differs in its ability to absorb heat in the atmosphere, or in its global warming potential. The values presented above are based on the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report and United Nations Framework Convention on Climate Change reporting guidelines (IPCC, 1996). Although the IPCC Fourth Assessment Report presents different estimates, the current inventory standard relies on the Second Assessment Report's intensity factors to comply with reporting standards and consistency with regional and national inventories (USEPA, 2010).

1.6 Climate Change Impacts

Increases in the globally averaged atmospheric concentration of GHGs will cause the lower atmosphere to warm, in turn inducing a myriad of changes to the global climate system. These large-scale changes will have unique and potentially severe impacts in the western United States, California, and the central coast region. Current research efforts coordinated through CARB, California Energy Commission, California Environmental Protection Agency (EPA), University of California system, and other entities are examining the specific changes to California's climate that will occur as the Earth's surface warms.

The best available climate models indicate that climate change could impact the natural environment in California in the following ways, among others (California Natural Resources Agency, 2009):

- Rising sea levels along the California coastline caused by ocean expansion and glacier melt
- Extreme-heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent
- An increase in heat-related human deaths, infectious diseases, and a higher risk of respiratory problems caused by deteriorating air quality
- Reduced snow pack and stream flow in the Sierra Nevada Mountains, affecting winter recreation and water supplies

- Potential increase in the severity and historical pattern of winter storms, affecting peak stream flows and flooding
- Changes in growing season conditions that could affect California agriculture, causing variations in crop quality and yield
- Changes in distribution of plant and wildlife species brought about by changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects

1.7 Implications for Pismo Beach

Rising temperatures affect local and global climate patterns, and these changes are forecasted to manifest themselves in a number of ways that may impact the central coast region. As further discussed in Chapter 4, *Adaptation*, according *ClimateWise: Integrated Climate Change Adaptation Planning in San Luis Obispo County in November 2010* (ClimateWise) potential climate changes that could occur in Pismo Beach by the end of this century include:

- Increased temperatures
- Sea level rise
- Storm surges
- Erosion
- Changed precipitation

1.8 Regulatory Background

This section summarizes the federal, state, and regional legislation, regulations, policies, and plans that have guided the preparation and development of this CAP.

1.8.1 FEDERAL

Clean Air Act. The U.S. EPA is the federal agency responsible for implementing the Clean Air Act. The U.S. Supreme Court ruled in its decision in *Massachusetts et al. v. Environmental Protection Agency et al*., issued on April 2, 2007, that carbon dioxide is an air pollutant as defined under the Clean Air Act and that the U.S. EPA has the authority to regulate emissions of GHGs as pollutants. In 2011, the U.S. EPA began regulating GHG emissions from new power plants and refineries through a set of New Source Performance Standards. These regulations are found in 40 CFR Part 60 and apply to new, modified and reconstructed affected facilities in specific source categories such as manufacturers of glass, cement, rubber tires and wool fiberglass.

Energy Independence and Security Act. The Energy Independence and Security Act of 2007 includes several provisions that will increase energy efficiency and the availability of renewable energy, which in turn will reduce GHG emissions. First, the Act sets a Renewable Fuel Standard

that requires fuel producers to use at least 36 billion gallons of biofuel by 2022. Second, it increased Corporate Average Fuel Economy (CAFE) Standards to require a minimum average fuel economy of 35 miles per gallon for the combined fleet of cars and light trucks by 2020. Third, it includes a variety of new standards for lighting and for residential and commercial appliance equipment, including residential refrigerators, freezers, refrigerator-freezers, metal halide lamps, and commercial walk-in coolers and freezers.

1.8.2 STATE OF CALIFORNIA

The State of California has been proactive in working to reduce emissions and has a long history of leadership in addressing energy and climate issues spanning the last 40 years. In 1988, AB 4420 (Sher, Chapter 1506, Statutes of 1988) designated the California Energy Commission as the lead agency for climate change issues in California. Since that time, numerous initiatives in California have addressed climate change and energy efficiency, the majority of legislation passed since 2000. These initiatives have strengthened the ability of entities in California to engage in accurate data collection and have created targets and regulations that will directly lead to reductions in GHG emissions. These initiatives are described below.

Executive Order S-3-05. Executive Order S-3-05, issued in 2005, was the first comprehensive state policy to address climate change. It established ambitious GHG reduction targets for the State: reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020 and to 80 percent below 1990 levels by 2050. This Executive Order is binding only for State agencies and has no force of law for local governments. However, S-3-05 is important for two reasons. First, it obligated State agencies to implement GHG emission reduction strategies. Second, the signing of the Order sent a clear signal to the Legislature about the framework and content for legislation to reduce GHG emissions as a necessary step toward climate stabilization.

Assembly Bill 32 (California Global Warming Solutions Act of 2006). AB 32 codified the State's 2020 GHG emissions target by directing CARB to reduce California's statewide emissions to 1990 levels by 2020. AB 32 also required CARB to develop a policy plan for reaching the 2020 emissions target and to adopt and enforce regulations to implement the plan. The resulting AB 32 Scoping Plan was adopted by CARB in December 2008. Key elements of the plan for achieving the 2020 target include:

- Adopting and implementing measures pursuant to existing state laws and policies, including California's goods movement measures and the Low Carbon Fuel Standard
- Expanding energy efficiency programs and green building practices
- Reducing methane emissions at landfills
- Developing a California cap-and-trade program
- Establishing and seeking to achieve reduction targets for transportation-related GHG emissions
- Increasing waste diversion, composting, and commercial recycling toward zero-waste

- Strengthening water efficiency programs
- Preserving forests that sequester carbon dioxide

Although the AB 32 Scoping Plan does not identify specific reductions for local governments, it identifies overall reductions from local government operations and land use decisions as a strategy to meet the 2020 target. The AB 32 Scoping Plan states that land use planning and urban growth decisions will play an important role in the State's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. It further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. However, the AB 32 Scoping Plan stopped short of identifying a mandatory target for local government compliance. Instead, it encourages local governments to adopt a target for City government and community-wide emissions that parallels the State's AB 32 target.

Senate Bill 97. SB 97 (2007) established that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis and required the Governor's Office of Planning and Research to develop guidelines to analyze GHG impacts under CEQA. The guidelines were adopted on December 31, 2009, requiring lead agencies to analyze GHG emissions and the effects of GHG emissions during CEQA review.

Assembly Bill 1493 (Pavley Regulations). AB 1493 (referred to as Pavley I) (2002) directed CARB to develop and adopt standards for vehicle manufacturers to reduce GHG emissions coming from passenger vehicles and light-duty trucks at a "maximum feasible and cost effective reduction" by January 1, 2005. Pavley I took effect for model years starting in 2009 to 2016 and Pavley II will cover 2017 to 2025. Fleet average emission standards would reach 22 percent reduction by 2012 and 30 percent by 2016.

Executive Order S-1-07 (Low Carbon Fuel Standard). This 2007 order requires fuel providers to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020.

Senate Bill 375. SB 375 (2008) supports implementation of AB 32 by aligning regional transportation planning efforts with land use and housing allocations in order to reduce transportation-related GHG emissions. Specifically, SB 375 directed CARB to set regional GHG emissions targets for passenger vehicles and light trucks for the years 2020 and 2035 for each Metropolitan Planning Organization (MPO) region, which were adopted in February 2011. The San Luis Obispo Council of Governments (SLOCOG), Pismo Beach's MPO, has adopted reduction targets for per capita emissions from passenger vehicles of 8 percent below baseline (2005) for the years 2020 and 2035 (CARB, 2011). These targets apply to the SLOCOG region as a whole, and not to individual cities or sub-regions. In 2008, GHG emissions from passenger vehicles in the San Luis Obispo region were approximately 16.5 pounds CO_2e per capita. Therefore, SLOCOG must reduce emissions to at least 15.18 pounds CO_2e per capita by 2020 and maintain or further reduce that level through 2035 to meet the target. SLOCOG's 2010 Regional Transportation Plan and Preliminary Sustainable Communities Strategy (RTP-PSCS),

adopted in 2010, details how the region will meet the target (refer to the discussion of SLOCOG's 2010 RTP-PSCS in Section 1.8.3 below).

Senate Bill 1078, Senate Bill 107, and Senate Bill 2X (Renewables Portfolio Standard). Established in 2002 under SB 1078, and accelerated in 2006 under SB 107, California's Renewables Portfolio Standard required investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources by at least 1 percent of their retail sales annually, until they achieved 20 percent by 2010. SB 2X raises the target from the current 20 percent, requiring private and public utilities to obtain 33 percent of their electricity from renewable energy sources by 2020.

Senate Bill 1368. SB 1368 (2006) directs the California Energy Commission and the California Public Utilities Commission to adopt a performance standard for GHG emissions for the future electricity used in California, regardless of whether it is generated in-state or purchased from other states.

Assembly Bill 811. AB 811 (2008) authorizes California cities and counties to designate districts within which willing property owners may enter into contractual assessments to finance the installation of renewable energy generation and energy efficiency improvements that are permanently fixed to the property. These financing arrangements would allow property owners to finance renewable energy generation and energy efficiency improvements through low-interest loans that would be repaid as an item on the property owner's property tax bill.

California Green Building Code. The California Green Building Code (2008) (the CALGreen Code) is the statewide green building code, which was developed to provide a consistent approach for green building within California. It lays out minimum requirements for newly constructed buildings in California, which will reduce GHG emissions through improved efficiency and process improvements. It requires builders to install plumbing that cuts indoor water use by as much as 20 percent, divert 50 percent of construction waste from landfills to recycling, and use low-pollutant paints, carpets, and floors.

California Code of Regulations Title 24, Part 6. Although it was not originally intended specifically to reduce GHG emissions, California Code of Regulations Title 24, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption, which in turn reduces fossil fuel consumption and associated GHG emissions. The standards are updated periodically to allow consideration and possible incorporation of new energy-efficient technologies and methods. The California Energy Commission estimates that the 2008 standards reduce consumption by 10 percent for residential buildings and 5 percent for commercial buildings, relative to the previous standards. For projects implemented after January 1, 2014, the California Energy Commission estimates that the 2013 Title 24 energy efficiency standards will reduce consumption by 25 percent for residential buildings and 30 percent for commercial buildings, relative to the 2008 standards. These percentage savings relate to heating, cooling, lighting, and water heating only and do not include other appliances, outdoor lighting that is not attached to buildings, plug loads, or other energy uses.

Assembly Bill 341. AB 341 (2011) establishes a new policy goal of the State of California to divert at least 75 percent of solid waste generated by the year 2020 in an effort to reduce GHG emissions. It also provides for mandatory commercial and multi-family residential recycling, and requires cities and counties to add a commercial and multi-family residential recycling element to their existing resource reduction plans.

1.8.3 REGIONAL

SAN LUIS OBISPO COUNTY AIR POLLUTION CONTROL DISTRICT

The APCD has primary responsibility for the development and implementation of rules and regulations designed to attain the National Ambient Air Quality Standards and California Ambient Air Quality Standards, as well as the permitting of new or modified sources, development of air quality management plans, and adoption and enforcement of air pollution regulations within San Luis Obispo County, which is located within the South Central Coast Air Basin. The APCD regulates most air pollutant sources, except for mobile sources, which are regulated by CARB or California EPA. State and local government projects, as well as projects proposed by the private sector, are subject to APCD requirements if the sources are regulated by the APCD.

The AB 32 Scoping Plan does not provide an explicit role for local air districts in implementing AB 32, but it does state that CARB will work actively with air districts in coordinating emissions reporting, encouraging and coordinating GHG reductions, and providing technical assistance in quantifying reductions. The ability of air districts to control emissions (both criteria pollutants and GHGs) is provided primarily through permitting as well as through their role as CEQA lead or commenting agency, the establishment of CEQA thresholds, and the development of analytical guidance for CEQA documents.

In March 2012, the APCD adopted GHG thresholds in order to help lead agencies meet the GHG reduction goals of AB 32. The APCD's approach to developing a threshold of significance for GHG emissions was to identify the GHG emissions level for which a project would not be expected to substantially conflict with existing California legislation adopted to reduce statewide GHG emissions. Different thresholds were developed to accommodate various development types and patterns and are summarized below in **Table 1-2**.

Table 1-2: SLOAPCD GHG Significance Thresholds

GHG Emission Source Category	Operational Emissions
Residential and Commercial Projects	Compliance with Qualified GHG Reduction Strategy OR Bright-Line Threshold of 1,150 MT

	CO_2e/yr OR Efficiency Threshold of 4.9 MT CO_2e/SP*/yr
(Industrial) Stationary Sources	10,000 MT of CO_2e/yr

*SP = Service Population (residents + employees). YR = Year
For projects other than stationary sources, compliance with either a Qualified GHG Reduction Strategy, or with the Bright-Line (1,150 CO_2e/yr) or Efficiency Threshold (4.9 MT CO_2e/SP/yr) would result in an insignificant determination, and in compliance with the goals of AB 32. The construction emissions of projects will be amortized over the life of a project and added to the operational emissions. Emissions from construction-only projects (e.g. roadways, pipelines, etc.) will be amortized over the life of the project and compared to an adopted GHG Reduction Strategy or the Bright-Line Threshold only.

The APCD recommends that lead agencies within the county use the adopted GHG thresholds of significance when considering the significance of GHG impacts of new projects subject to CEQA. Further, projects with GHG emissions that exceed the thresholds will need to implement mitigation to reduce the impacts to a less than significant level, which can be accomplished through a Mitigated Negative Declaration or an Environmental Impact Report.

As identified in the APCD thresholds, if a project is consistent with an adopted Qualified GHG Reduction Strategy (e.g., CAP meeting criteria identified in Section 1.4 above) that addresses the project's GHG emissions, it can be presumed that the project will not have significant GHG emission impacts. This approach is consistent with CEQA Guidelines Section 15183.5.

As discussed in Section 1.4 above, this CAP was developed to be consistent with CEQA Guidelines Section 15183.5 to mitigate emissions and climate change impacts and will therefore serve as a Qualified GHG Reduction Strategy for the City of Pismo Beach.

SAN LUIS OBISPO COUNCIL OF GOVERNMENTS

SLOCOG is the local Council of Governments with responsibility for regional planning for San Luis Obispo County. SLOCOG's planning efforts address regional issues relating to transportation, land use and urban form, housing, environment, economic development, regional public facilities, and climate change. Plans that SLOCOG has adopted that support GHG emissions reductions in Pismo Beach are described below.

Rideshare Program. The Rideshare Program is a division of SLOCOG that focuses on outreach and events to promote bicycling, walking, carpooling, vanpooling, and riding the bus. Some of the major programs include:

- Bike month and Rideshare month.
- Transportation Choices Program – This is a free program in San Luis Obispo County offered to businesses and organizations that encourage their employees to use sustainable transportation. The goal of the Transportation Choices Program is to equip employers with the tools needed promote positive change in employee commuting habits.

- Mobility Management Program - The goal of the program is to bridge the communications gap between Public Transit Operators and Social Services Agencies.
- Safe Routes to School Program - Safe Routes to School is a national and international movement to enable and encourage students to walk and bicycle to school. Through the use of education, encouragement, enforcement, engineering and evaluation, programs and projects are being developed to create a safe, healthy and fun environment for walking and biking to school.
- Senior Transportation Choices Program - Rideshare works hand-in-hand with seniors throughout the county, providing tools and education on how to use public transportation and community transportation services. Through our Senior Transportation Choices Program, we provide transportation information, Transit Field Trips and personalized trip planning.

Planning for Alternative Modes. SLOCOG focuses planning efforts to support the use of the following alternative modes of transportation:

- **Bikes –** SLOCOG supports and promotes bicycling as a viable transportation choice. SLOCOG staff attend Bicycle Advisory Committees in the City of San Luis Obispo and San Luis Obispo County. SLOCOG staff also review and advise jurisdictions on approval of BTA eligible Bicycle Plans.
- **Pedestrians –** SLOCOG is in the process of developing the Northern San Luis Obispo County Salinas River Corridor Anza Trail Master Plan.
- **Bus –** SLOCOG works with all transit providers to coordinate services. The Transit Operators Group is an Ad Hoc committee of transit operators, contractors, and SLOCOG staff. Coordinating projects include the Coordinated Human Services Public Transportation Plan, the Region Wide Fare Improvement Study, and the Long Range Transit Plan.
- **Rail –** SLOCOG coordinates and prepares agendas for the Coast Rail Coordinating Council (CRCC). The purpose of the CRCC is to improve the frequency and speed of passenger trains on the coast route between San Francisco and Los Angeles.

Community 2050 Regional Blueprint. Community 2050 is a collaborative planning effort that utilizes scenario planning to study long-range regional growth. Community 2050 outlines a program to improve multimodal mobility through a combination of strategies and investments to accommodate growth in transportation demand and reduce congestion that will contribute to a strong economy.

2010 Regional Transportation Plan – Preliminary Sustainable Communities Strategy (RTP-PSCS). The RTP-PSCS, most recently updated in 2010, is a comprehensive plan guiding transportation policy for the region and makes recommendations concerning improvements to the existing transportation network of highways, transit, air, water, rail, and bicycling. The plan helps position the region to achieve smarter, more sustainable growth that meets the transportation needs of the growing population and changing region. The primary purpose of the RTP-SCS is to integrate sustainable communities strategies developed under the Community

2050 Regional Blueprint and continue progress in accomplishing the intermodal mix of policies, programs and projects in the adopted RTP, Vision 2025, adopted in 2005. The 2010 RTP-PSCS contains a "Preliminary" Sustainable Communities Strategy consistent with the purpose and intent of state bills related to GHG emissions GHGs and climate change, including AB 32 and the SB 375.

2012 SCS-compliant RTP Update. SLOCOG is currently working to prepare a 2012 SCS-complaint RTP. This update will build upon and further refine the efforts of the 2010 RTP-PSCS to adjust alternatives to satisfy State requirements of SB 375. SLOCOG must reduce per capita GHG emissions from passenger vehicles by 8 percent relative to 2005 levels in 2020 and 2030.

LOCAL GOVERNMENT ROLES AND RESPONSIBILITIES

The AB 32 Scoping Plan establishes a framework for achieving statewide GHG reductions required by AB 32. Specifically, the AB 32 Scoping Plan describes a list of measures that the State will undertake, and the anticipated GHG reductions associated by these measures, by 2020. Because the State does not have jurisdictional control over all of the activities that produce GHG emissions in California, the AB 32 Scoping Plan articulates a unique role for local governments in helping to achieve the statewide GHG reduction target, noting their broad influence and, in some cases, exclusive authority over activities that contribute to significant direct and indirect GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and City government operations. As such, the AB 32 Scoping Plan recommends that local governments reduce GHG emissions from both their City government operations and community at large.

CHAPTER 2

GHG EMISSIONS AND REDUCTION TARGET

2.0 GHG Emissions and Reduction Target

A GHG emissions inventory identifies the major sources and quantities of GHG emissions produced by community-wide activities and City government facilities and operations within a jurisdiction's boundaries for a given year. Estimating GHG emissions enables local governments to establish an emissions baseline, track emissions trends, identify the greatest sources of GHG emissions within their jurisdiction, set targets for future reductions, and create an informed mitigation strategy based on this information.

This chapter summarizes the results of the GHG Emissions Inventory (2013). The GHG Emissions Inventory includes a 2005 baseline inventory of GHG emissions resulting from community-wide activities and City government facilities and operations within Pismo Beach. It also includes a 2020 business-as-usual forecast of how emissions would change over time as a result of population and job growth if consumption trends and efficiencies remained at their 2005 levels, absent of any new policies or actions that would reduce emissions. Since 2005, there have been several State regulations and local initiatives that have been implemented that will reduce Pismo Beach's GHG emissions. Therefore, this chapter also presents a 2020 adjusted forecast to account for the impact of these measures to provide a more accurate picture of future emissions growth in 2020. In addition, this chapter identifies the City's GHG emissions reduction target for the year 2020. **Appendix A** contains the complete GHG Emissions Inventory and supporting documentation.

2.1 2005 Baseline GHG Emissions

This section summarizes the methodology used to complete the 2005 baseline inventory of community-wide activities and City government facilities and operations, and the results.

2.1.1 METHODOLOGY

The 2005 baseline inventory quantifies the amount of GHG emissions that occurred within the City limits in the year 2005. It includes a community-wide inventory that details the sources and quantities of GHG emissions resulting from activities from the Pismo Beach community as a whole, and a City government operations inventory that identifies the sources and quantities of emissions resulting from the City of Pismo Beach's operations and facilities. The City government operations inventory is a subset of the community-wide inventory, such that the City government's emissions are included within the community-wide inventory.

The community-wide inventory is divided into the following sectors, or categories of emissions sources: residential energy use, commercial and industrial energy use, transportation, off-road vehicles and equipment, solid waste, and wastewater. The City government operations inventory provides a more detailed analysis of emissions resulting from City-owned or -operated buildings and facilities, fleet vehicles, and streetlights and traffic signals; water delivery; wastewater; solid waste; and employee commute travel.

The City government operations inventory follows the *Local Government Operations Protocol* (version 1.1), which was adopted in 2010 by CARB and serves as the national standard for quantifying and reporting GHG emissions from local government operations. The community-wide inventory follows the *Association of Environmental Professionals (AEP) California Community-wide GHG Baseline Inventory Protocol (AEP Protocol)* (June 2011) and *ICLEI International Local Government GHG Emissions Analysis Protocol (IEAP*) (October 2009). These protocols provide standard accounting principles, boundaries, quantification methods, and procedures for reporting GHG emissions. Like all emissions inventories, this inventory must rely on the best-available data and calculation methodologies at the time of preparation, and therefore, represents a best estimate of GHG emissions following standard methodologies. As protocols are updated, as better data and calculation methodologies become available, the inventory can be updated and improved. Nevertheless, the findings of this analysis provide a solid basis upon which Pismo Beach is planning and taking action to reduce its GHG emissions.

2.1.2 COMMUNITY-WIDE GHG EMISSIONS

In 2005, the Pismo Beach community emitted approximately 87,077 MT CO_2e as a result of activities that took place within the residential energy use, commercial and industrial energy use, transportation, off-road, and solid waste sectors. As shown in **Figure 2-1** and **Table 2-1**, the transportation sector was the largest contributor of GHG emissions, generating approximately 51,811 MT CO_2e, or 60 percent of total 2005 emissions. Transportation sector emissions are the result of diesel and gasoline fuel used in on-road vehicles traveling to and/or from locations within Pismo Beach.[1] Electricity and natural gas consumption within the commercial and industrial sector was the second largest contributor (14,959 MT CO_2e, or 17 percent) with electricity and natural gas consumption from the residential sector close behind (14,808 MT CO_2e, or 17 percent). Emissions from solid waste sent to landfills (3,479 MT CO_2e, or four percent), off-road vehicles and equipment (1,821 MT CO_2e, or two percent), and wastewater (200 MT CO_2e, or less than one percent) accounted for the remainder of community-wide emissions.

[1] Excludes pass-through trips that do not have an origin or destination within the Pismo Beach city limits. Emissions take into account the regional mix of vehicle classes and model years, as well as ambient conditions and travel speeds that determine fuel efficiency. Types of emissions accounted for include: running exhaust, idle exhaust, starting exhaust, diurnal, resting loss, running loss, and hot soak. Refer to **Appendix A** for further information.

Figure 2-1: Community-wide GHG Emissions by Sector (2005)

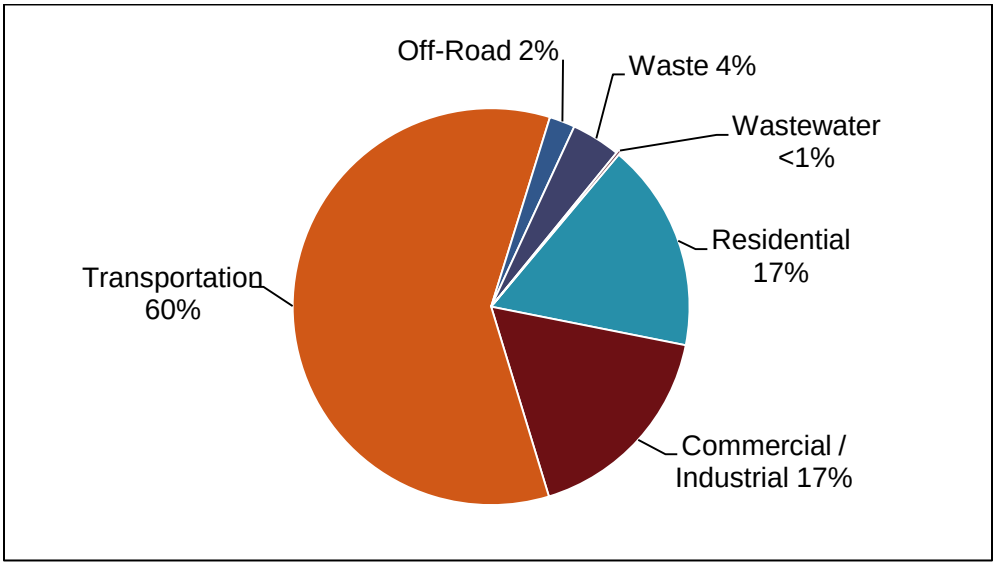


Table 2-1: Community-wide GHG Emissions by Sector (2005)

Sector	Description	GHG Emissions (MT CO_2e)	Percent of Total
Residential	Electricity and natural gas used in homes	14,808	17%
Commercial/Industrial	Electricity and natural gas used in commercial and industrial buildings	14,958	17%
Transportation	Gasoline and diesel used in on-road vehicles	51,811	60%
Off-Road Vehicles and Equipment	Gasoline, diesel, and compressed natural gas used in off-road vehicles and equipment	1,821	2%
Solid Waste	Methane from the decomposition of landfilled solid waste	3,479	4%
Wastewater	Methane and nitrous oxide released in the wastewater treatment process	200	<1%
Total		**87,077**	**100%**

2.1.3 CITY GOVERNMENT OPERATIONS GHG EMISSIONS

In 2005, City government operations generated approximately 1,897 MT CO_2e. This quantity represents approximately two percent of Pismo Beach's total community-wide GHG emissions. As shown in **Figure 2-2** and **Table 2-2**, wastewater facilities were the City's largest contributor (28 percent of total emissions). Emissions from employee commute (16 percent), the City's feet vehicles (16 percent), and solid waste (14 percent) were also a significant source of emissions. Emissions from water delivery (12 percent), electricity and natural gas used at City buildings

(nine percent), and electricity used for streetlights and traffic signals (five percent) accounted for the remainder of the City's emissions.

Figure 2-2: City Government GHG Emissions by Sector (2005)

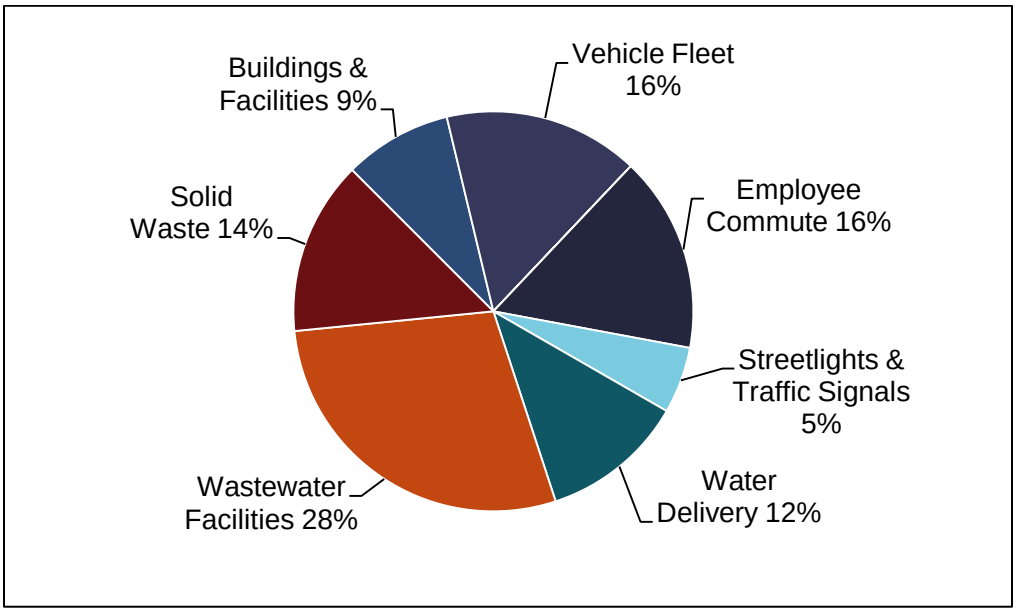


Table 2-2: City Government GHG Emissions by Sector (2005)

Sector	Description	GHG Emissions (MT CO_2e)	Percent of Total
Vehicle Fleet	Diesel and gasoline consumption and vehicle type	300	16%
Employee Commute	Annual vehicle miles travelled from sample of employee commuting patterns	301	16%
Buildings and Facilities	Electricity and natural gas consumption in City-owned or –operated buildings and facilities	166	9%
Streetlights &Traffic Signals	Electricity used to power streetlights, traffic signal lights, and other public outdoor lighting	102	5%
Solid Waste	Annual waste tonnage sent to landfill	267	14%
Water Delivery	Electricity used for water transport resulting from City operations	221	12%
Wastewater Facilities	Electricity consumption from wastewater facilities	540	28%
Total		**1,897**	**100%**

2.2 2020 GHG Emissions Forecast

2.2.1 METHODOLOGY

The GHG emissions forecast provides a "business-as-usual estimate" of how emissions would change in the year 2020 if consumption trends continue as they did in 2005, absent any new federal, state, regional, or local policies or actions that would reduce emissions. The year 2020 was selected for the forecast in order to maintain consistency with AB 32.

The GHG emissions forecast is based on projected growth trends in population, jobs, and vehicle miles traveled (VMT) and the assumption that the emissions per sector will change over time in proportion to population, jobs, and VMT. Population and job projections for the year 2020 were obtained from the San Luis Obispo Council of Governments (SLOCOG) report, *San Luis Obispo County 2040 Population, Housing & Employment Forecast* (August 2011). The "mid-range" cases for population and job growth were used for this forecast. VMT estimates from SLOCOG's regional travel demand model for the year 2020 were provided by Fehr & Peers.

2.2.2 2020 BUSINESS-AS-USUAL FORECAST

Under the business-as-usual scenario, Pismo Beach's GHG emissions are projected to grow by approximately 39 percent by the year 2020, from 87,077 MT CO_2e to 120,801 MT CO_2e. Emissions associated with the transportation sector are projected to experience the highest level of growth (60 percent).[2] **Table 2-3** and **Figure 2-3** show the results of the forecast.

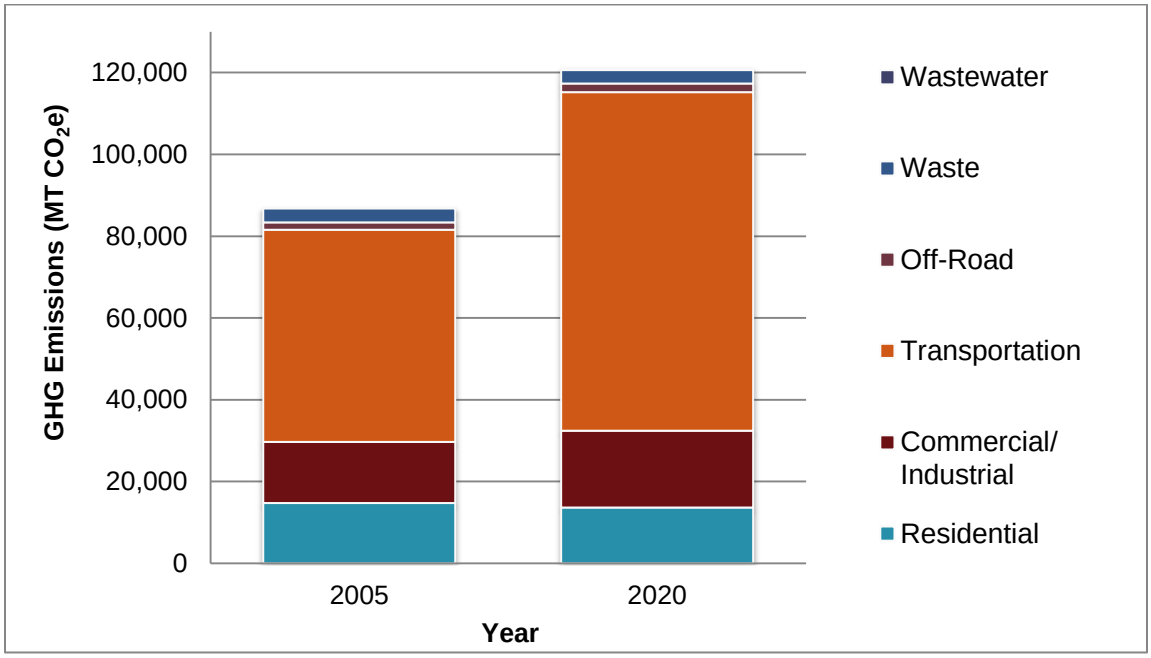
Table 2-3: 2020 Business-As-Usual GHG Emissions Forecast

Sector	2005 (MT CO_2e)*	2020 (MT CO_2e)*	Percent Change from 2005 to 2020
Residential	14,808	13,664	-8%
Commercial / Industrial	14,958	18,775	26%
Transportation	51,811	82,794	60%
Solid Waste	3,479	3,210	-8%
Off-Road	1,821	2,174	19%
Wastewater	200	184	-8%
TOTAL	**87,077**	**120,801**	**39%**

***Refer to **Appendix A** for details

[2] This is largely due to a greater imbalance between population and jobs in 2020 than 2005. In addition, Pismo Beach imports and exports vehicle trips throughout the entire county, and has a large number of retail jobs, which have very high trip generation rates.

Figure 2-3: 2020 Business-As-Usual GHG Emissions Forecast



2.2.3 2020 ADJUSTED FORECAST

INCORPORATION OF STATE REDUCTIONS INTO FORECAST

The AB 32 Scoping Plan identifies several State regulations that will reduce GHG emissions within Pismo Beach. These State regulations require no additional local action. Therefore, they were incorporated into the forecast and reduction assessment to create an "adjusted forecast," which provides a more accurate picture of future emissions growth and the responsibility of the City once State measures to reduce GHG emissions have been implemented. A brief description of each of these measures is provided below and the calculation details are located in **Appendix B** of this document. **Table 2-4** summarizes the reduction in local emissions that is anticipated to result.

Table 2-4: Summary of State Reductions

State Measure	2020 Reduction (MT CO_2e)*
Clean Car Standards, AB 1493 (Pavley I)	-10,995
Low-Carbon Fuel Standard (on-road transportation)	-7,180
Low-Carbon Fuel Standard (off-road vehicles)	-218
Title 24	-423
Renewable Portfolio Standard	-5,961
Total State Reduction	**-24,777**

*Refer to **Appendix B** for calculation details

Clean Car Standards, AB 1493 (Pavley I)

Signed into law in 2002, AB 1493 (Pavley I standard) requires vehicle manufactures to reduce GHG emissions from new passenger vehicles and light trucks from 2009 through 2016. The CARB anticipates that the Pavley I standard will reduce GHG emissions from new California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016. The Pavley I standard is expected to reduce transportation sector emissions in Pismo Beach by approximately 10,995 MT CO_2e.

Low Carbon Fuel Standard

The Low Carbon Fuel Standard requires a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. Measured on a lifecycle basis, the carbon intensity represents the CO_2e emitted from each stage of producing, transporting, and using the fuel in a motor vehicle. This translates to an approximately nine percent (or 7,180 MT CO_2e) reduction in Pismo Beach's on-road transportation sector GHG emissions and a 10 percent (or 218 MT CO_2e) reduction in its off-road sector GHG emissions in 2020 compared to business-as-usual levels.

Title 24

Although it was not originally intended specifically to reduce GHG emissions, California Code of Regulations Title 24, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption, which in turn reduces fossil fuel consumption and associated GHG emissions. The standards are updated periodically to allow consideration and possible incorporation of new energy-efficient technologies and methods. The updates that have occurred since the 2005 baseline year and, therefore, were not included in the business-as-usual forecast, include the 2008 and 2013 Title 24 Energy Efficiency Standards. The California Energy Commission estimates that the 2008 standards reduce consumption by 10 percent for new residential buildings and five percent for new commercial buildings, relative to the 2005 standards. For projects implemented after January 1, 2014, the California Energy Commission estimates that the 2013 Title 24 Energy Efficiency Standards will reduce consumption by 25 percent for new residential buildings and 30 percent for new commercial buildings, relative to the 2008 standards. The 2008 and 2013 Title 24 requirements would reduce emissions in Pismo Beach by approximately 423 MT CO_2e in 2020.[3]

Renewable Portfolio Standard

The State of California Renewable Portfolio Standard requires investor-owned utilities, electric service providers, and community choice aggregators to increase the portion of energy that comes from renewable sources to 20 percent by 2010 and 33 percent by 2020. PG&E is the electricity provider in Pismo Beach. In order to calculate future emissions that take into account the Renewable Portfolio Standard, PG&E's 2020 emissions factor was applied (PG&E, 2011).

[3] The AB 32 Scoping Plan calls for the continuation of ongoing triennial updates to Title 24 that will yield regular increases in the mandatory energy and water savings for new construction. Future updates to Title 24 standards for residential and non-residential alterations are not taken into consideration due to lack of data and certainty about the magnitude of energy savings that will be realized with each subsequent update.

As shown in **Table 2-4**, the Renewable Portfolio Standard would reduce Pismo Beach's GHG emissions by approximately by 5,961 MT CO_2e in 2020.

Sustainable Communities and Climate Protection Act – Senate Bill 375

SB 375, the Sustainable Communities and Climate Protection Action of 2008, enhances California's ability to reach its AB 32 target by aligning regional transportation planning efforts with land use and housing allocations in order to reduce transportation-related GHG emissions. As mentioned in Chapter 1, *Introduction*, SLOCOG must reduce per capita GHG emissions from passenger vehicles by eight percent relative to 2005 levels in 2020 and 2030.

While the outcome of SB 375 in terms of a reduction in VMT per capita is specified by the State, achievement of the target is dependent on regional and local actions and activities that are not regulated by the State. Many of these actions and activities are inextricably linked to local actions which rely on implementation assumptions that will need to be monitored to ensure effectiveness. Therefore, GHG reductions resulting from implementation of SB 375 have not been included as a State measure that would reduce GHG emissions within Pismo Beach.

INCORPORATION OF LOCAL REDUCTIONS INTO FORECAST

In addition to the State measures described above, the City of Pismo Beach has completed a number of local actions since the 2005 baseline inventory year that will reduce the community's GHG emissions. It is important to note that local measures which rely on future implementation actions and assumptions are included in Chapter 3, *Climate Action Measures*, as they will need to be monitored to ensure effectiveness. A brief description of each of these local measures is provided below by topic area and the local reduction in GHG emissions in 2020 is summarized in **Table 2-5** (see **Appendix B** for supporting details).

Table 2-5: Summary of Local Reductions

Local Measure	2020 Reduction (MT CO_2e)
Energy	
Solar Energy Installations (Commercial and Residential)	-21
Energy Efficient Street Lights and Traffic Signals	-8
Transportation and Land Use	
Street and Sidewalk Improvements	-4
Waste	
Construction and Demolition Debris Diversion	-186
Water	
Water Conservation Programs to Meet SB X7-7 Target	-23
Total Reduction from Local Measures	**-242**

Energy Measures

Between 2006 and 2012, residents of Pismo Beach have installed 60 kilowatts (kW) of solar photovoltaic systems and businesses have installed 24 kW. These solar power installations are expected to lower residential GHG emissions by 15 MT CO_2e and commercial GHG emissions

by six MT CO_2e in 2020. Along with the renewable energy generation projects, the City completed energy efficient street and traffic light upgrades. These projects resulted in an estimated electricity reduction of 57,756 kWh annually, lowering emissions by eight MT CO_2e.

Transportation and Land Use Measures

Transportation and land use measures implemented between 2006-2012, including bicycle and pedestrian network improvements are expected to reduce VMT and enhance non-automobile mobility. These improvements are estimated to reduce GHG emissions by approximately four MT CO_2e in 2020.

Solid Waste Measures

As of 2010, the California Green Building Code requires that all local jurisdictions ensure that 50 percent of all non-hazardous construction and demolition solid waste is diverted from landfills. Within Pismo Beach, this is estimated to reduce emissions by 186 MT CO_2e in 2020.

Water Measures

The City has implemented a number of programs to reduce per capita water consumption by 20 percent, pursuant to SB X7-7. In 2020, water conservation programs identified in the City's Urban Water Management Plan are expected to reduce GHG emissions by approximately 23 MT CO_2e in 2020.

ADJUSTED FORECAST

As shown in **Table 2-6**, State and local measures will reduce GHG emissions in Pismo Beach by an estimated 25,019 MT CO_2e in 2020. Under the adjusted scenario GHG emissions are projected to decrease to 95,782 MT CO_2e (approximately 21 percent below the business-as-usual scenario of 120,801 MT CO_2e).

Table 2-6: Summary of Reductions from State and Local Measures and 2020 GHG Emissions

	GHG Emissions (MT CO_2e)
2020 Business-as-Usual Forecast	120,801
2020 Reduction from State Measures	-24,777
2020 Reduction from Local Measures	-242
Total Reduction from State and Local Measures	**-25,019**
2020 Adjusted Forecast	**95,782**

2.3 GHG Emissions Reduction Target

The AB 32 Scoping Plan recommends, but does not require, that local governments adopt a community-wide emissions target that parallels the State's AB 32 target of 1990 levels by 2020,

which it identifies as approximately 15 percent below "current"[4] emissions levels by 2020. Based on this recommendation, the City identified a preliminary GHG emissions reduction goal for the purposes of initial CAP development of 15 percent below 2005 levels.

During development of the CAP, the City assessed the effect of the state's reduction measures and evaluated a wide range of potential local GHG reduction measures to examine the feasibility, cost, and benefits of potentially meeting the preliminary reduction target. Based on the analysis, it was determined that the preliminary target of 15 percent was not technically feasible due to the City's inability to influence one of its major sources of transportation emissions. A large portion of the City's transportation emissions are due to long-range trips resulting primarily from vacationers living in the Central Valley, which the City has very limited ability to influence. Currently there is no public transportation infrastructure spanning those distances, nor could this transportation be provided by the year 2020. The City has therefore created this plan to implement a suite of feasible GHG reduction measures that will reduce emissions to the extent feasible at this time and has established a reduction target of 10 percent below 2005 emissions levels by 2020.

As shown in **Table 2-7** and **Figure 2-4**, to meet the reduction target Pismo Beach will need to reduce its community-wide emissions to 78,369 MT CO_2e by 2020. This will require reducing community-wide GHG emissions 18 percent below the adjusted forecast levels[5] (equivalent to 17,413 MT CO_2e) by 2020 through implementation of local measures and actions.

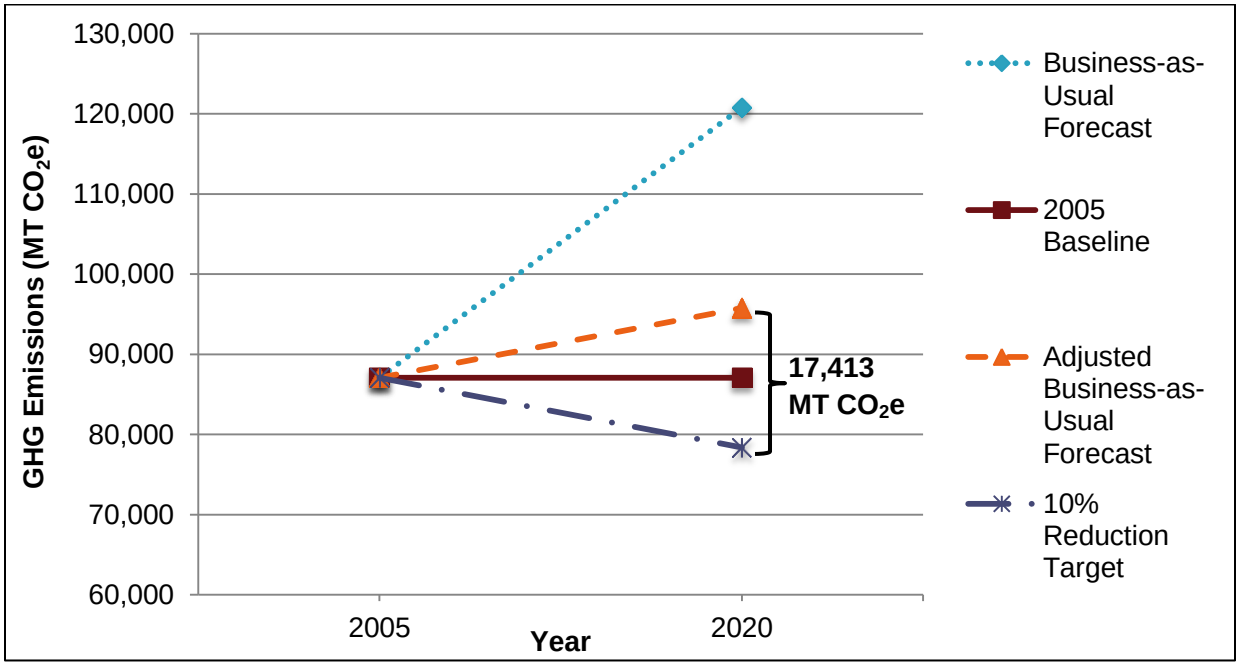
Table 2-7: Pismo Beach's GHG Emissions, Target, and Reduction Necessary to Meet Target

	GHG Emissions (MT CO_2e)
2005 Baseline Emissions	87,077
2020 Adjusted Forecast	95,782
Target (10% below 2005 levels by 2020)	78,369
Remaining Gap Necessary to Meet Target	**17,413**

[4] "Current" as it pertains to the AB 32 Scoping Plan is commonly understood as sometime between 2005 and 2008.

[5] As described in Section 2.3, the adjusted 2020 forecast accounts for approved, programmed, and/or adopted State- and local-level measures that will reduce local GHG emissions. Therefore, it is used to determine the necessary reductions to meet the City's reduction target as it provides a more accurate picture of future emissions growth and the proportionate share of emissions the City must reduce once State measures to reduce GHG emissions have been implemented.

Figure 2-4: GHG Emissions in Relation to Target



CHAPTER 3

CLIMATE ACTION MEASURES

3.0 Climate Action Measures

This chapter identifies the measures that the City will implement to achieve its GHG emissions reduction target of 10 percent below 2005 levels by 2020. The City has identified a set of measures based on careful consideration of the sources and distribution of emissions identified in the GHG emissions inventory, existing priorities and resources, and the potential costs and benefits of each measure. Many of the CAP measures are also consistent with the measures of neighboring jurisdictions and regional agencies which is important for feasible and effective implementation. Detailed analyses of the GHG reduction potential and estimated costs and savings for each measure are located in **Appendix B**.

3.1 Chapter Organization

The climate action measures, which represent ways to reduce GHG emissions, are organized into the following focus areas: City government operations, energy, transportation and land use, off-road, solid waste, and tree planting. The discussion of each focus area begins with an introduction, followed by a summary table listing the measures within the focus area and the associated GHG reduction potential, where applicable. Following the introduction to each focus area, each measure is presented with the following information:

- **Existing or Completed Efforts:** a list of efforts the City has implemented or is in the process of implementing since the baseline year (2005) to accomplish the measure.
- **Implementation Actions:** the specific steps the City will take to achieve the GHG emission reduction and outcome of the measure.
- **GHG Reduction Potential:** the estimated reduction in GHG emissions anticipated in 2020.
- **Costs and Savings:** potential costs and savings to the City or community (private) are categorized as none, very low, low, medium, and high. **Table 3-1** summarizes these category definitions. Costs account for the expense that would occur beyond conducting business-as-usual (i.e., without implementation of the CAP) (refer to **Appendix B** for details).

Table 3-1: Measure Cost and Savings

Aggregated City Government Costs/Savings	Per Unit Community Cost/Savings
Very Low: $1 - $10,000 Low: $10,001 - $50,000 Medium: $50,001 - $100,000 High: $100,001 or greater	Very Low: $1 - $500 Low: $501 - $1,000 Medium: $1,001 - $5,000 High: $5,001 or greater

Details related to measure implementation and monitoring, including responsible parties, performance criteria, implementation time frames, and potential funding sources are located in Chapter 5, *Implementation and Monitoring*.

3.2 City Government Operations Measures

The City has already taken a number of steps that have resulted in GHG emissions reductions, as identified in Chapter 2, *GHG Emissions and Reduction Target*, and is committed to building on those efforts. This focus area identifies measures and actions the City can implement to further reduce GHG emissions from City government operations and facilities. Although the GHG emissions that result from City government operations and facilities account for less than two percent of Pismo Beach's community emissions, as an employer, property-owner, and regulatory entity, the City can set an example of GHG emissions reduction practices for the community and demonstrate additional benefits of the measures beyond reducing GHG emissions, such as cost savings in buildings and operations and improved operational efficiency. As shown in **Table 3-2**, the City government operations measures have the potential to reduce Pismo Beach's GHG emissions by 294 MT CO_2e by 2020.

In addition to reducing GHG emissions, the City government measures described in this section have the potential to provide other important benefits to the community. These benefits include:

- City leadership
- Reduced operating and maintenance costs
- Improved public health
- Improved air and water quality
- Resource conservation
- Lower maintenance costs and extended equipment lives

Table 3-2: City Government Operations GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
C-1	City Government Energy Efficiency Retrofits and Upgrades	39
C-2	City Government Energy Efficient Public Realm Lighting	8
C-3	Energy Efficiency Requirements for New City-owned Buildings	13
C-4	Renewable Energy Systems on City Property	7
C-5	Transportation Demand Management (TDM) Program for City Employees	14
C-6	Zero and Low Emission City Fleet Vehicles	92
C-7	City Government Solid Waste Reduction	121
City Government Operations Total		**294**

C-1: City Government Energy Efficiency Retrofits and Upgrades

GHG Reduction Potential:
39 MT CO_2e
City Cost:
Varies
City Savings:
Medium
Private Cost:
None
Private Savings:
None

Establish a target to reduce City government energy use by 10 percent by 2020 and implement cost-effective improvements and upgrades to achieve that target.

Implementation Actions:

- **C-1.1:** Adopt a City government energy use target.
- **C-1.2:** Complete energy audits and benchmarking of all City-owned or -operated facilities, leveraging existing programs, such as PG&E's Automated Benchmarking Service or the U.S. EPA's ENERGY STAR Challenge program.
- **C-1.3:** Maintain a regular maintenance schedule for heating and cooling, ventilation and other building functions.
- **C-1.4:** Establish a prioritized list of energy efficiency upgrade projects and implement them as funding becomes available.
- **C-1.5:** Install an energy management system that monitors energy use and controls heating, cooling, and ventilation to increase efficiency.

C-2: City Government Energy Efficient Public Realm Lighting

GHG Reduction Potential:
8 MT CO_2e
City Cost:
Low
City Savings:
Low
Private Cost:
None
Private Savings:
None

Continue to replace City-owned or -operated street, traffic signal, park, and parking lot lights with higher efficiency lamp technologies.

Existing and/or Completed Efforts in Support of Measure:

- The City has conducted an inventory of existing outdoor public light fixtures.

Implementation Actions:

- **C-2.1:** Identify and secure funding to replace additional inefficient City-owned or -operated public lighting.

C-3: Energy Efficiency Requirements for New City-owned Buildings

Adopt a policy to exceed minimum Title 24 Building Energy Efficiency Standards by a certain percentage for the construction or renovation of new City buildings and facilities.

Implementation Actions:

- **C-3.1:** Adopt a policy to exceed Title 24 building efficiency standards by a 30 percent.

GHG Reduction Potential:
13 MT CO_2e
City Cost:
Low
City Savings:
Very Low
Private Cost:
None
Private Savings:
None

C-4: Renewable Energy Systems on City Property

Pursue on-site small-scale renewable energy generation at City government facilities.

Implementation Actions:

- **C-4.1:** Identify funding sources and opportunities for City government renewable energy generation.
- **C-4.2:** Install small-scale solar photovoltaic (PV) systems, solar hot water heaters, or other renewable energy projects at select City government facilities.

GHG Reduction Potential:
7 MT CO_2e
City Cost:
High
City Savings:
Very Low
Private Cost:
None
Private Savings:
None

C-5: Transportation Demand Management (TDM) Program for City Employees

Implement a TDM program to reduce annual vehicle miles traveled (VMT) associated with City employee commutes.

Implementation Actions:

- **C-5.1:** Establish an ordinance that requires the City to meet employee commute trip VMT reduction targets by offering one or more services from a menu of options, including: encourage the use of the carpools; provide ride matching services and assistance; allow flexible work schedules and telecommuting; provide end of trip facilities (parking, showers, lockers); provide subsidized transit passes; hire a transportation coordinator to manage TDM programs; or others at the employer's discretion.

GHG Reduction Potential:
14 MT CO_2e
City Cost:
Very Low
City Savings:
Low
Private Cost:
None
Private Savings:
None

- **C-5.2:** Develop, implement, and promote a TDM program for City employees that includes incentives to reduce single-occupancy vehicle trips, such as ride matching services and assistance, flexible work schedules or telecommuting opportunities, end of trip facilities (parking, showers, lockers), subsidized transit passes, etc.
- **C-5.3:** Participate in and promote annual regional commute trip reduction events.
- **C-5.4:** Hire a transportation coordinator to manage TDM programs.
- **C-5.5:** Require parking cash-out (a requirement that City employers who subsidize employee parking costs provide an equivalent cash reimbursement for employees who choose not to drive).

C-6: Zero- and Low-Emission City Fleet Vehicles

Continue to replace official City vehicles and equipment with more efficient and/or alternatively fueled vehicles.

Implementation Actions:

- **C-6.1:** Develop and adopt a low- and zero- emissions replacement/purchasing policy for official City vehicles and equipment. This would not apply to vehicles with special performance requirements.
- **C-6.2:** Work with the Central Coast Clean Cities Coalition to obtain funding to purchase low-emission and zero-emission fleet vehicles.
- **C-6.3:** Replace 10 vehicles by 2020.

GHG Reduction Potential:
92 MT CO_2e
City Cost:
Low
City Savings:
Very Low
Private Cost:
None
Private Savings:
None

C-7: City Government Solid Waste Reduction

Establish a 25 percent solid waste diversion rate over 2005 baseline levels and identify steps to meet that rate by 2020.

Implementation Actions:

- **C-7.1:** Develop and adopt a City purchasing policy that emphasizes recycled and recyclable materials.
- **C-7.2:** Install recycling receptacles at City-owned or -operated buildings and facilities.

GHG Reduction Potential:
121 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Savings:
None

3.3 Community-wide Measures

3.3.1 ENERGY MEASURES

Energy use accounts for 34 percent of Pismo Beach's total baseline GHG emissions. These emissions result from the combustion of fossil fuel, primarily coal, oil, and natural gas, which is used to heat, cool, and provide power to residential, commercial, and industrial buildings and other facilities. Factors affecting energy-related emissions in buildings include building design and the efficiency of technology and electronics in buildings. GHG emissions reductions can be achieved both by changes to the energy demand (e.g., improving energy efficiency and reducing consumption) and energy supply (e.g., switching from a high-carbon to a low- or zero-carbon technology or fuel). The energy measures listed in **Table 3-3** focus on these strategies and have the potential to reduce Pismo Beach's GHG emissions by 2,130 MT CO_2e by 2020.

In addition to reducing GHG emissions, the energy measures described in this section have the potential to provide other important benefits to the community, including:

- Reduced energy and operating costs
- Lower maintenance costs and extended equipment lives
- Increased building re-sale value
- Strengthened local economy
- Resource conservation
- Increased electricity reliability
- Improved air quality

Table 3-3: Energy GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
E-1	Energy Efficiency Outreach and Incentive Programs	190
E-2	Energy Audit and Retrofit Program	938
E-3	Income-Qualified Energy Efficient Weatherization Programs	63
E-4	Incentives for Exceeding Title 24 Building Energy Efficiency Standards	87
E-5	Small-Scale On-Site Solar Photovoltaic (PV) Incentive Program	803
E-6	Income-Qualified Solar PV Program	49
Energy Total		**2,130**

Measure E-1: Energy Efficiency Outreach and Incentive Programs

GHG Reduction Potential:
190 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
Varies
Private Savings:
Very Low

Expand participation in and the promotion of existing energy efficiency programs, such as Energy Upgrade California and San Luis Obispo County Energy Watch, to increase community awareness of existing energy efficiency rebates and financial incentives.

Implementation Actions:

- **E-1.1:** Conduct additional outreach and promotional activities, either individually or in collaboration with San Luis Obispo County Energy Watch, targeting specific groups or sectors within the community (e.g., homeowners, renters, businesses, etc.).
- **E-1.2:** Designate one week per year to conduct an energy efficiency outreach campaign targeting a specific group. The campaign week can also be used to recognize and encourage programs and educational outreach conducted by industry organizations, non-governmental entities, government agencies, and other community groups.
- **E-1.3:** Direct community members to existing program websites, such as Energy Upgrade California and San Luis Obispo County Energy Watch.

Measure E-2: Energy Audit and Retrofit Program

GHG Reduction Potential:
938 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None to Medium
Private Savings:
Very Low to Medium

Facilitate voluntary energy assessments, retrofits, and retrocommissioning of residential and commercial buildings within Pismo Beach.

Existing and/or Completed Efforts:

- The City has highlighted the effectiveness of energy audits and retrofits by showcasing the success of retrofit projects (e.g., on the City's website or in its newsletter).

Implementation Actions:

- **E-2.1:** Develop and promote a residential and commercial energy audit program, either individually or in collaboration with San Luis Obispo County Energy Watch, local utilities, and/or neighboring jurisdictions.
- **E-2.2:** Conduct outreach and promotional activities targeting specific groups (e.g., owners of buildings built prior to Title 24 [1980]) in order to promote the audit and retrofit program.
- **E-2.3:** As part of the business licensing and renewal process, encourage businesses to participate in the program and receive an energy audit.

- **E-2.4:** Participate in and promote a single-family residential energy efficiency financing program to encourage investment in energy efficiency upgrades.
- **E-2.5:** Continue to participate in and promote the AB 811 CaliforniaFIRST energy efficiency financing program for multi-family residential and commercial buildings.
- **E-2.6:** Work with Energy Upgrade California, local utilities, and/or community businesses and organizations, to annually conduct a "do-it-yourself" workshop for building energy retrofits.
- **E-2.7:** Continue to highlight the effectiveness of energy audits and retrofits by showcasing the success of retrofit projects (e.g., on the City's website or in its newsletter).

Measure E-3: Income-Qualified Energy Efficient Weatherization Programs

GHG Reduction Potential:
63 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Private Savings:
Low

Facilitate energy efficient weatherization of low- and middle-income housing through promotion of existing programs.

Implementation Actions:

- **E-3.1:** Facilitate and promote existing income-qualified weatherization programs, such as PG&E's Middle Income Direct Install program, either individually or by partnering with a local organization.

Measure E-4: Incentives for Exceeding Title 24 Energy Efficiency Building Standards

GHG Reduction Potential:
87 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
Medium to High
Private Savings:
Very Low to Medium

Provide incentives (e.g., priority permitting, reduced permit fees, etc.) for new development and/or major remodels that voluntarily exceed State energy efficiency standards.

Implementation Actions:

- **E-4.1:** Collaborate with community organizations and businesses, local utilities, and other local jurisdictions in the region to develop and promote a technical assistance and best practices program that aids developers in selecting and implementing energy efficiency measures that exceed State standards.
- **E-4.2:** Identify, provide and promote incentives (e.g., expedited or streamlined permitting, deferred fees, public recognition, etc.) for applicants whose project exceeds State requirements by a specified percent.

- **E-4.3:** Update building permit process to incentivize higher building performance (e.g. buildings that integrate and optimize major high-performance building attributes, including energy efficiency, durability, and life-cycle performance).
- **E-4.4:** Launch an educational campaign for builders, permit applicants, and the general public to promote best practices and incentive programs; provide information and assistance about energy efficiency options online and at permit counter.

Measure E-5: On-Site Small-Scale Solar PV Incentive Program

GHG Reduction Potential:
803 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
High
Private Savings:
Medium to High

Facilitate the voluntary installation of on-site small-scale solar PV systems and solar hot water heaters in the community through expanded promotion of existing financial incentives, rebates, and financing programs, and by helping residents and business owners overcome common regulatory barriers and upfront capital costs.

Implementation Actions:

- **E-5.1:** Conduct a comprehensive review of the City's solar permitting process based on the Governor's Office of Planning and Research's (OPR) *California Solar Permitting Guidebook* (June 2012), identifying any existing barriers to facility implementation.
- **E-5.2:** Improve the permit review and approval process for small solar PV systems by implementing recommendations for streamlined permitting identified in the California Solar Permitting Guidebook (e.g., use standardized forms, provide clear written instructions on the permitting process and a checklist of required application materials, make information available on the City's website and at the permit counter, etc.).
- **E-5.3:** Collaborate with other local jurisdictions in the region to standardize requirements across jurisdiction, by using common promotion and permit materials, such as checklists and standard plans, to reduce permit submittal errors among contractors working throughout a region.
- **E-5.4:** Participate in and promote a renewable energy financing program to encourage investment in small-scale on-site solar PV systems.
- **E-5.5:** Expand education on and promotion of existing incentive, rebate, and financing programs for solar PV systems and solar hot water heaters targeting specific groups or sectors within the community.
- **E-5.6:** Designate one week per year to conduct a renewable energy outreach campaign targeting a specific group. The campaign week can also be used to recognize community members that have implemented noteworthy or unique renewable energy projects.

Measure E-6: Income-Qualified Solar PV Program

GHG Reduction Potential:
49 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Private Savings:
Medium

Facilitate the installation of solar PV systems on and solar hot water heaters in income-qualified housing units by promoting existing programs offered through the California Solar Initiative and New Solar Homes Partnership and by collaborating with organizations, such as GRID Alternatives, on outreach and eligibility.

Implementation Actions:

- **E-6.1:** Collaborate with GRID Alternatives and/or other community organizations to provide targeted education and outreach to developers and homeowners about incentives offered through the Single Family Affordable Solar Homes (SASH) Program[1] and the Multifamily Affordable Solar Homes Program (MASH).
- **E-6.2:** Provide targeted outreach regarding solar water heating incentives offered through the California Solar Initiative, including the SASH and MASH Programs.

[1] The California Solar Initiative's SASH Program provides fully subsidized systems to very low-income households, and highly subsidized systems to other low-income households. GRID Alternatives, a non-profit solar organization, manages the $108 million SASH Program on the California Public Utility Commission's behalf.

3.3.2 TRANSPORTATION AND LAND USE MEASURES

Transportation-related emissions made up 60 percent of Pismo Beach's baseline GHG emissions. Factors affecting GHG emissions from transportation include the number of VMT, fuel economy, and the type of fuel used. The number of VMT is directly influenced by the geographic distribution of people and places, especially the density of development and zoning. Therefore, land use measures are included in this section. The transportation and land use measures listed in **Table 3-4** have the potential to reduce Pismo Beach's GHG emissions by 14,244 MT CO_2e by 2020.

The transportation and land use measures in this section will not only help reduce GHG emissions, but also provide multiple other benefits to the community. These include:

- Reduced transportation costs
- Reduced traffic congestion
- Improved public health
- Strengthened local economy
- Improved infrastructure
- Increased equity
- Increased housing and travel options
- Resource conservation
- Reduced noise, air, and water pollution

Table 3-4: Transportation and Land Use GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
TL-1	Bicycle Network	687
TL-2	Pedestrian Network	485
TL-3	Expand Transit Network	643
TL-4	Increase Transit Service Frequency/Speed	835
TL-5	Transportation Demand Management Incentives	1,825
TL-6	Parking Supply Management	940
TL-7	Public Parking Pricing	171
TL-8	Electric Vehicle Network and Alternative Fueling Stations	2,842
TL-9	Smart Growth	5,816
Transportation Total		**14,244**

Measure TL-1: Bicycle Network

GHG Reduction Potential:
687 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Private Savings:
Very Low

Continue to improve and expand the city's bicycle network and infrastructure.

Implementation Actions:

- **TL-1.1:** Continue to pursue public and private funding to expand and link the city's bicycle network in accordance with the General Plan and Bicycle Plan.
- **TL-1.2:** Annually identify and schedule street improvement and maintenance projects to preserve and enhance the bicycle network.
- **TL-1.3:** Incorporate bicycle facility improvements into pavement resurfacing, restriping, and signalization operations where the safety and convenience of users can be improved within the scope of work.
- **TL-1.4:** Coordinate with and support SLOCOG in the implementation of bicycle plans to facilitate non-auto travel within and between communities.
- **TL-1.5:** Collaborate with the San Luis Obispo Bicycle Coalition to assist with event promotions and publications to increase awareness and ridership during Bike Month.
- **TL-1.6:** Through conditions of approval, require new subdivisions and large developments to incorporate bicycle lanes, routes, and/or shared-use paths into street systems to provide a continuous network of routes, facilitated with markings, signage, and bicycle parking.
- **TL-1.7:** Continue to enforce mandatory California Green Building Standards Code bicycle parking standards for non-residential development.

Measure TL-2: Pedestrian Network

GHG Reduction Potential:
485 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Private Savings:
Varies

Continue to improve and expand the city's pedestrian network.

Existing and/or Completed Efforts:

- The City annually identifies and schedules sidewalk improvement and maintenance projects to preserve and enhance the pedestrian circulation network.
- The City incorporates pedestrian facilities improvements into pavement resurfacing, restriping, and signalization operations where the safety and convenience of users can be improved within the scope of work.

- The City requires that new development projects provide a pedestrian access network that internally links all uses and connects all existing or planned external streets and pedestrian facilities contiguous with the project site. The City also requires that the new development projects minimize barriers to pedestrian access and interconnectivity.
- The City requires new development to implement traffic calming improvements as appropriate (e.g., marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, median islands, mini-circles, tight corner radii, etc.) through conditions of approval.

Implementation Actions:

- **TL-2.1:** Continue to pursue public and private funding to expand and link the city's pedestrian network.
- **TL-2.2:** Continue to expand and promote the Safe Routes to School program.

Measure TL-3: Expand Transit Network

Work with the Regional Transit Authority (RTA) and transit service providers to expand the local transit network (i.e., additional routes or stops, and/or expanded hours of operation) based on the greatest demand for service.

GHG Reduction Potential:
643 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
Low
Private Savings:
High

Implementation Actions:

- **TL-3.1:** Work with RTA and transit service providers to implement the Short Range Transit Plan.
- **TL-3.2:** Work with the San Luis Obispo Regional Transit Authority and local transit agency to identify and map existing and future bus lines (routes) and transit corridors.
- **TL-3.3:** Support the addition of transit routes that provide intercity express services.
- **TL-3.4:** Continue to research federal and local funding for transit service upgrade projects.
- **TL-3.5:** Through the development review process, require new development to provide safe and convenient access to alternative and public transportation within the project area as feasible.

Measure TL-4: Increase Transit Service Frequency/Speed

GHG Reduction Potential:
835 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
Low
Private Savings:
High

Work with the RTA and transit services providers to increase transit service frequency (i.e., reducing headways) by identifying routes where increased bus frequency would improve service.

Implementation Actions:

- **TL-4.1:** Work with RTA and transit service providers to shorten regional service headways (e.g., by purchasing additional buses, re-routing existing buses, etc.) to 30 minutes or shorter at commute peaks subject to passenger load demand.
- **TL-4.2:** Support streamlined transit services and infrastructure that create a bus rapid transit network on main commute corridors.

Measure TL-5: TDM Incentives

GHG Reduction Potential:
1,825 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Private Savings:
Very Low

Work with San Luis Obispo Regional Ride Share and Ride-On to conduct additional outreach and marketing of existing TDM programs and incentives to discourage single-occupancy vehicle trips and encourage alternative modes of transportation, such as carpooling, taking transit, walking, and biking.

Implementation Actions:

- **TL-5.1:** Collaborate with San Luis Obispo Ride Share and Ride-On to conduct additional outreach through event promotions and publications, targeting specific groups or sectors within the community (e.g., employers, employees, students, seniors, etc.).
- **TL-5.2:** Provide information on and promote existing employer based TDM programs as part of the business licensing and renewal process.
- **TL-5.3:** Collaborate with San Luis Obispo Ride Share and the San Luis Obispo Bicycle Coalition to assist with event promotions and publications to increase awareness and ridership during Bike Month and Rideshare month.
- **TL-5.4:** Direct community members to existing program websites (e.g., Ride Share, Ride-On) by providing links on the City's website.

Measure TL-6: Parking Supply Management

Reduce parking requirements in areas such as the downtown where a variety of uses and services are planned in close proximity to each other and to transit.

GHG Reduction Potential:
940 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Private Savings:
Medium

Implementation Actions:

- **TL-6.1:** Amend the Municipal Code to reduce parking requirements (e.g., eliminate or reduce minimum parking requirements, create maximum parking requirements, and/or allow shared parking).
- **TL-6.2:** Establish optional in-lieu fees in place of minimum parking requirements where appropriate.

Measure TL-7: Public Parking Pricing

Establish market-based pricing for public parking spaces, where appropriate.

GHG Reduction Potential:
171 MT CO_2e
City Cost:
Low
City Savings:
High
Private Cost:
Medium
Private Savings:
Very Low

Implementation Actions:

- **TL-7.1:** Separate parking spaces and associated costs from housing and commercial developments in order to allocate the true cost of parking directly to users.
- **TL-7.2:** Add meters to public parking spaces, where appropriate, and charge market prices.
- **TL-7.3:** Set prices to achieve 85 percent utilization on each block face and 90 percent utilization in each off-street lot.
- **TL-7.4:** Conduct parking occupancy studies to consider priority areas for price increases.

Measure TL-8: Electric Vehicle Network and Alternative Fueling Stations

Continue to work with the APCD, Central Coast Clean Cities Coalition, and neighboring jurisdictions to create and implement the electric vehicle readiness plan.

GHG Reduction Potential:
2,842 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Private Savings:
None

Implementation Actions:

- **TL-8.1:** Continue to work with the APCD, Central Coast Clean Cities Coalition, and neighboring jurisdictions to create and implement the electric vehicle readiness plan through expanding the use of alternative fuel

vehicles and fueling stations in the community (e.g., through identifying and zoning locations for fueling stations, offering incentives for alternative fuel vehicles, etc.).

- **TL-8.2:** Provide streamlined installation and permitting procedures for vehicle charging facilities, utilizing tools provided in the electric vehicle readiness plan (e.g., sample charging permits, model ordinances, development guidelines, outreach programs).
- **TL-8.3:** Pursue funding for plug-in electric vehicle charging stations.

Measure TL-9: Smart Growth

Facilitate mixed-use, higher density, and infill development near existing or planned transit stops, in existing community centers/downtown, and in other designated areas.

GHG Reduction Potential:
5,816 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
Varies
Private Savings:
Varies

Implementation Actions:

- **TL-9.1:** Provide and promote incentives (e.g., parking reductions, priority permitting, etc.) for mixed-use and very high-density development that has a minimum density of 20 dwelling units per acre and is located within ¼-mile of an existing or planned transit stop or park and ride facility with regularly scheduled, daily service.
- **TL-9.2:** Develop a form-based zoning code for the central business district/downtown. Form-based codes emphasize building form rather than use. This increases flexibility for a variety of complementary uses to be permitted in the same area, and the potential for mixed-use development, which helps to reduce vehicle miles traveled.

3.3.3 OFF-ROAD VEHICLES AND EQUIPMENT MEASURE

Emissions in the off-road sector result from the combustion of fuel, primarily diesel, gasoline, and compressed natural gas, which is used to power off-road equipment and vehicles. Off-road equipment and vehicles include those used in construction, agriculture, commercial, industrial, and landscaping operations as well as recreational vehicles. Factors affecting off-road emissions include the age, type, and usage of the vehicle or equipment.

GHG emissions reductions can be achieved by using equipment that runs on electricity or alternative fuels. The off-road equipment measure listed in **Table 3-5** focuses on this strategy and has the potential to reduce Pismo Beach's GHG emissions by 87 MT CO_2e by 2020.

The off-road measure in this section will not only help reduce GHG emissions, but will also provide multiple other benefits to the community. These include:

- Improved air and water quality
- Reduced noise pollution
- Improved public health

Table 3-5: Off-Road Vehicle and Equipment GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
O-1	Off-Road Equipment Upgrades, Retrofits, and Replacements	87
Off-Road Vehicle and Equipment Total		**87**

Measure O-1: Off-Road Equipment Upgrades, Retrofits, and Replacements

Continue to work with the APCD and promote existing programs that fund off-road equipment and vehicle upgrades, retrofits, and replacement through the Carl Moyer heavy-duty vehicle and equipment program or other funding mechanisms.

GHG Reduction Potential:
87 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Private Savings:
Varies

Implementation Actions:

- **O-1.1:** Conduct additional outreach and promotional activities targeting specific groups (e.g., agricultural operations, construction companies, homeowners, etc.).
- **O-1.2:** Direct community members to existing program websites (e.g., APCD, Carl Moyer Grant page).

3.3.4 SOLID WASTE MEASURES

As solid waste decomposes in landfills, it releases methane, a GHG 21 times more potent than carbon dioxide (USEPA, 2012). In 2005, Pismo Beach sent approximately 11,921 tons of waste to landfills.

Waste management is an important action that the community can take to reduce GHG emissions. Waste management can be achieved by reducing the amount of trash and other waste that is discarded; reusing containers, products, and building materials; and recycling as many materials as possible, including green waste and construction materials. The solid waste measure listed in **Table 3-6** has the potential to reduce Pismo Beach's GHG emissions by 908 MT CO_2e by 2020.

In addition to reducing GHG emissions, the solid waste measure described in this section has the potential to provide other important benefits to the community. These include:

- Improved air quality
- Resource conservation

Table 3-6: Solid Waste GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
S-1	Solid Waste Diversion	908
Solid Waste Total		**908**

Measure S-1: Solid Waste Diversion

Adopt a solid waste diversion rate target that exceeds the state-mandated rate of 50 percent and identify programs to meet the identified rate by 2020.

Implementation Actions:

- **S-1.1:** Adopt a solid waste diversion rate of 80 percent (30 percent above the state-mandated rate of 50 percent).[2]
- **S-1.2:** Identify programs to meet the identified diversion rate (e.g. office recycling programs, purchasing policies, etc.).
- **S-1.3:** Develop an education and outreach program in support of the diversion rate.

GHG Reduction Potential:
908 MT CO_2e
City Cost:
Very Low
City Savings:
None
Private Cost:
None
Private Savings:
None

[2] In 2012, the City had a diversion rate of 71 percent.

3.3.5 TREE PLANTING MEASURE

Trees and other vegetation absorb and capture the GHG carbon dioxide from the atmosphere in a process called carbon sequestration. By maintaining a healthy urban forest, prolonging the life of trees, and continually increasing the number of trees, Pismo Beach can increase its net carbon storage over the long term. Trees and other vegetation also reduce local air and surface temperatures by shading buildings, streets, and sidewalks.

The tree measure listed in **Table 3-7** has the potential to reduce Pismo Beach's GHG emissions by 12 MT CO_2e by 2020.

In addition to reducing GHG emissions, the tree planting measure described in this section has the potential to provide other important benefits to the community. These include:

- City beautification
- Increased property values
- Improved air quality
- Improved water quality
- Improved public health
- Reduced surface and air temperatures
- Reduced noise pollution

Table 3-7: Tree Planting GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
T-1	Tree Planting Program	12
Tree Planting Total		**12**

Measure T-1: Tree Planting Program

Facilitate voluntary tree planting within the community, working with local non-profit organizations and community partners.

GHG Reduction Potential:
12 MT CO_2e
City Cost:
Low
City Savings:
None
Private Cost:
Very Low
Private Savings:
None

Implementation Actions:

- **T-1.1:** Develop a tree planting assistance program, which provides resources, labor, and subsidies to participating community members.
- **T-1.2:** Develop and adopt tree planting guidelines that address tree and site selection. Emphasis should be placed on native, drought-tolerant trees.
- **T-1.3:** Track the number of trees planted annually.

3.4 GHG Reduction Summary

As discussed in Chapter 2, *GHG Emissions and Reduction Target*, Pismo Beach will need to reduce its GHG emissions by 17,413 MT CO_2e by 2020 to meet its 10 percent reduction target. The GHG reduction measures in this CAP are estimated to reduce Pismo Beach's GHG emissions by 17,675 MT CO_2e by 2020, as summarized in **Table 3-8**. Therefore, the implementation of the measures identified in this chapter would enable Pismo Beach to meet its 10 percent reduction target by 2020.

Table 3-8: Summary of GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reduction (MT CO_2e)
City Government Operations		
C-1	City Government Energy Efficiency Retrofits and Upgrades	39
C-2	City Government Energy Efficient Public Realm Lighting	8
C-3	Energy Efficiency Requirements for New City-owned Buildings	13
C-4	Renewable Energy Systems on City Property	7
C-5	TDM Program for City Employees	14
C-6	Zero- and Low-Emission City Fleet Vehicles	92
C-7	City Government Solid Waste Reduction	121
	City Government Operations Subtotal	*294*
Energy		
E-1	Energy Efficiency Outreach and Incentive Programs	190
E-2	Energy Audit and Retrofit Program	938
E-3	Income-Qualified Energy Efficient Weatherization Programs	63
E-4	Incentives for Exceeding Title 24 Building Energy Efficiency Standards	87
E-5	Small-Scale Solar PV Incentive Program	803
E-6	Income-Qualified Solar PV Program	49
	Energy Subtotal	*2,130*
Transportation and Land Use		
TL-1	Bicycle Network	687
TL-2	Pedestrian Network	485
TL-3	Expand Transit Network	643
TL-4	Increase Transit Service Frequency/Speed	835
TL-5	TDM Incentives	1,825
TL-6	Parking Supply Management	940
TL-7	Public Parking Pricing	171
TL-8	Electric Vehicle Network and Alternative Fueling Stations	2,842
TL-9	Smart Growth	5,816
	Transportation and Land Use Subtotal	*14,244*
Off-Road Vehicles and Equipment		
O-1	Equipment Upgrades, Retrofits, and Replacements	87
	Off-Road Vehicles and Equipment Subtotal	*87*
Solid Waste		
S-1	Solid Waste Diversion	908
	Solid Waste Subtotal	*908*
Tree Planting		
T-1	Tree Planting Program	12
	Tree Planting Subtotal	*12*
TOTAL REDUCTION		**17,675**

CHAPTER 4

ADAPTATION

4.0 Adaptation

There are two responses to climate change available to local governments: mitigation and adaptation. The previous chapter addressed climate change mitigation, by identifying measures to reduce GHG. This chapter identifies measures to prepare for and minimize the risks associated with anticipated climate change impacts and increase resiliency to those changes. Drawing on a recent climate adaptation planning process that took place in San Luis Obispo County, this chapter identifies climate change predictions for the region and specific to Pismo Beach. This chapter also provides an assessment of populations and infrastructure within Pismo Beach that are particularly vulnerable to the identified impacts and identifies measures to increase community resilience to those effects.

"Adaptation planning at the local, state, and national levels can limit the damage caused by climate change, as well as reduce the long-term costs of responding to the climate related impacts that are expected to grow in number and intensity in the decades to come" (PEW Center on Global Climate Change, 2011).

4.1 Climate Change Predictions and Vulnerability

Climate change is a global phenomenon that has the potential to impact local health, agriculture, natural resources, infrastructure, emergency response, tourism, and many other facets of society. As climate change continues to progress, increased stress to vulnerable populations and sectors of society are expected. In 2010, key stakeholders, elected officials, city and county planners, land managers, public health officials, concerned citizens, scientists, and the Local Government Commission initiated a process to address climate change adaptation in San Luis Obispo County. As part of this process, scientists from Geos Institute identified anticipated climate change impacts in the region and threats to socioeconomic and natural systems. The range of potential impacts presented in the document *ClimateWise: Integrated Climate Change Adaptation Planning in San Luis Obispo County in November 2010* (ClimateWise) are based on projections of climate change in the San Luis Obispo region using three of the best-available models (MIROC, HadCM, and CSIRO) and an emissions scenario drawn from those used by the Intergovernmental Panel on Climate Change (IPCC).

According to ClimateWise, climate change could lead to the following potential changes in the San Luis Obispo County region and the City of Pismo Beach:

- Increased temperatures – Average temperatures in San Luis Obispo County are expected to become 2 to 4 degrees warmer by mid-century and possibly 4 to 8 degrees warmer by late century, depending on emission levels (ClimateWise, 2010). Greater warming is expected to occur in the summer months compared to winter. If coastal fog decreases, Pismo Beach may experience more significant temperature increases. In addition, the community should anticipate more frequent heat waves,[1] with at least one more per year by 2050 and four to eight more per year by 2100 (California Adaptation

[1] The California Adaptation Planning Guide (2012) defines heat waves as five days over 79°F to 85°F.

Planning Guide, 2012). A secondary impact of increased temperatures is poorer air quality, largely due to increased ground level ozone and potentially increased particulate matter levels, and allergens such as pollen.

- Changed precipitation – Precipitation, except during winter months, is anticipated to change little in the near future. However, climate models forecast drier conditions throughout San Luis Obispo County by 2075 as a result of a five to 15 percent reduction in average annual rainfall. As a result, droughts may become more frequent, longer and more severe. Models also show that when rainfall does occur, it is likely to fall in the form of more intense rainstorms (ClimateWise, 2010).
- Sea level rise – Statewide studies project that sea level could rise 12 to 16 inches above current levels by 2050 and 3.3 to 4.6 feet (23 to 55 inches) above current levels by the end of the century (Cal-Adapt 2010). According to Cal-Adapt, land in Pismo Beach vulnerable to a 100-year flood event as sea level rises will increase 13 percent. Secondary impacts of sea level rise include increased erosion of coastal bluffs and beaches, coastal flooding, permanent inundation of coastal wetlands, and saltwater intrusion into coastal freshwater wells.
- Storm surges – Sea level rise combined with the tidal effect of larger and more intense oceanic storms is expected to create higher periodic storm surges. These extreme 'high tides' can cause impacts over and above those predicted to occur as a result of sea level rise mentioned above. Impacts from storm surges may include the following: flooding of low-lying coastal areas, beach and cliff erosion, and inundation of infrastructure and wetlands (ClimateWise, 2010).

Based on these climate changes a vulnerability assessment was completed to determine the degree to which the physical, socioeconomic, or natural factors that compose a system are susceptible to, and potentially unable to accommodate, the negative effects of climate change. The assessment was comprised of three primary components:

- Exposure – a determination of whether the system will experience a specific changing climate condition or impact (see climate change impacts described above).
- Sensitivity – a determination of the aspects of a community (e.g., populations, structures or functions) that will be affected by changes in climate conditions (e.g., temperature and precipitation) or specific climate change impacts (e.g., sea level rise, increased water temperature).
- Adaptive Capacity – the ability of an affected system to cope with extreme events, make adaptive changes, or transform to a greater extent, including the ability to moderate potential damages and to take advantage of opportunities.

Each of these components contributes to understanding the overall vulnerability (limited ability to adapt or cope with climate change impacts once exposed) of a functional system (Snover, 2007). Climate change will most impact those individuals and systems that have both the greatest exposure and sensitivity to climate change impacts, in addition to the lowest adaptive capacity (see **Table 4-1**). For each climatic risk, the populations and structures most vulnerable depends on the unique combination of these three factors (ClimateWise, 2010).

Table 4-1: Climate Change Vulnerability

Components of Vulnerability	Climatic Risks	Populations or Infrastructure Particularly at Risk
Exposure	Heat Drought Coastal flooding	Outdoor workers, low-income households, elderly, infants All water users Floodplain residents, structures and facilities
Sensitivity	Heat Air pollution Sea-level rise	Infants, elderly, outdoor workers, low-income households Asthma sufferers, children, elderly Coastal residents
Adaptive Capacity	Heat Air Pollution Floods Sea-level rise	Low-income households, outdoor workers Asthma sufferers, children, elderly Low-income households Coastal residents, structures and facilities

Source: ClimateWise, 2010

The vulnerability assessment, which is consistent with the ClimateWise findings revealed the following critical vulnerabilities for Pismo Beach:

- Low-income households, elderly persons, children, and outdoor workers are most vulnerable to heat waves.
- Large areas along Pismo State Beach will be highly vulnerable to sea-level rise and related hazards, such as coastal flooding, erosion, and salt-water intrusion. This is especially critical in the area around the outlet of Pismo Creek. Coastal roads (particularly Highway 1 and possibly part of Highway 101) and bridges, beachfront businesses and homes, and recreational and touristic facilities would be most affected.
- Crucial supporting infrastructure and services will experience greater demands or challenges as climate change-related risks grow, including for already scarce water supplies, transportation infrastructure, and emergency preparedness and services.
- Water supply shortages, which are already a serious problem, are expected to worsen. Climatic conditions are expected to be drier, with longer, hotter summers, and the water supply from the Sierras is expected to decline. Higher temperatures and continued population growth suggest there will be a growing demand for water while supplies are shrinking. Saltwater intrusion into coastal aquifers with shallow water tables will worsen with sea level rise.
- Businesses, residents, and infrastructure located within low-lying coastal areas would be more susceptible to damage or disruption by larger than average storm events. Currently, there is insufficient infrastructure to accommodate a momentary surplus of water, and large areas of impervious pavement prevent much of the water from infiltrating into the ground. This is most critical in the area surrounding Pismo Creek and the associated Pismo Beach Wastewater Treatment Plant.

4.2 Adaptation Measures

The following measures focus on items the City of Pismo Beach can implement in adapting to climate change. The goal of these measures is to reduce impacts to the community, the economy, and local natural resources. Recognizing the link between public health and climate adaptation, this chapter recommends adaptation measures that are designed to reduce the negative impacts of climate change on sensitive populations and communities. Measures were developed from those identified in the ClimateWise program, the World Bank Primer on Reducing Vulnerabilities to Disaster, International Council for Local Environmental Initiatives (ICLEI), and the California Natural Resources Agency's Climate Adaptation Strategy.

Measure A-1: Climate Change Vulnerability

Periodically reassess regional climate change vulnerabilities.

Implementation Actions:

- **A-1.1:** Participate in inter-agency and or inter-jurisdictional meeting and planning activities to periodically reassess regional climate change vulnerabilities.
- **A-1.2:** Incorporate newly identified adaptation measures into planning documents as appropriate.

Measure A-2: Public Health and Emergency Preparedness

Prepare for anticipated climate change effects on public health, the local economy, and populations that may bear a disproportionate burden of the climate change effects.

Implementation Actions:

- **A-2.1:** Collaborate with community-based organizations (such as health care providers, public health advocates, fire prevention organizations, etc.) to disseminate public preparedness and emergency response information related to climate change.
- **A-2.2:** Conduct training exercises at public forums as well as distribute publicly available information on emergency exit routes and methods.
- **A-2.3:** Identify and focus planning and outreach programs on vulnerable populations including neighborhoods that currently experience social or environmental injustice or bear a disproportionate burden of potential public health impacts.

Measure A-3: Water Management

Implement new policies and programs to limit community exposure to threats such as flooding, and support those that encourage water use conservation and efficiency.

Implementation Actions:

- **A-3.1:** Collaborate with other jurisdictions to address water supply threats, flooding, and wastewater management.

- **A-3.2:** Continue to seek grants and other sources of funding, including the State Integrated Regional Water Management Grant Program and mitigation opportunities, to enhance flood control and improve water quality.
- **A-3.3:** Encourage the use of recycled water and graywater systems and low-impact development (LID) techniques.

Measure A-4: Infrastructure

Work to improve the resilience of systems that provide the resources and services critical to community function.

Implementation Actions:

- **A-4.1:** Assess the potential impact of climate change as part of the update of plans that manage community infrastructure systems.
- **A-4.2:** Complete an assessment, including economic impacts and threats to public health and safety, for projected climate change impacts on local transportation, water, wastewater, stormwater, energy, and communication systems.
- **A-4.3:** Develop mitigation plans for protection of the wastewater treatment facility and the relocation or elevation of vulnerable infrastructure.

Measure A-5: Coastal Resource Protection

Prepare for anticipated climate change effects on vulnerable coastal resources.

Implementation Actions:

- **A-5.1:** Monitor and study specific beach profiles and resource vulnerability.
- **A-5.2:** Plan for future beach changes by implementing policies and programs to address resource vulnerabilities, such as fresh water supplies, beach replenishment and/or artificial dune creation.
- **A-5.3:** Study measures to implement a program of managed realignment, i.e., setting back the line of actively maintained defenses, thus creating an intertidal habitat to attenuate wave energy and reduce erosion.

CHAPTER 5

IMPLEMENTATION AND MONITORING

5.0 Implementation and Monitoring

Implementation and monitoring are essential components of the CAP to ensure that Pismo Beach reduces its GHG emissions and meets its target. This chapter identifies key steps that the City will take to implement the CAP and monitor the progress in reducing Pismo Beach's GHG emissions. It also describes potential funding sources and mechanisms available to implement the CAP.

5.1 Implementation Matrix

Ensuring that the CAP measures translate into measurable reductions in GHG emissions is critical to the success of the CAP. To facilitate this, each measure and its corresponding implementation actions identified in Chapter 3, *Climate Action Measures*, and Chapter 4, *Adaptation*, is listed in the implementation matrix in **Table 5-1** along with the following items:

- **Responsible Department(s):** The City department that will be primarily responsible for implementing, monitoring, and reporting on the progress of the selected measure and corresponding actions.
- **Implementation Time Frame:** The phase in which this measure should begin implementation. Please note that measures already underway with existing or recently completed efforts in support of the measure are categorized as near-term. Time frames include:
    - Near-Term – By 2015
    - Mid-Term – 2016-2017
    - Long-Term – 2018-2020
- **City Cost and Savings Estimates:** For each measure, potential costs and savings to the City are categorized as none ($0), very low ($1-$10,000), low ($10,001-$50,000), medium ($50,001-$100,000), and high ($100,001 or greater). Supporting information on costs and savings is provided in **Appendix B**.
- **GHG Reduction Potential:** The GHG reduction potential value identifies the estimated annual emission reductions anticipated in 2020, measured in MT CO_2e. Supporting information pertaining to the GHG reduction calculations is provided in **Appendix B**.
- **Performance Indicator:** Performance indicators enable the City to generally monitor measure progress.

Table 5-1: Implementation Matrix

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
Local Government Operations							
C-1: City Government Energy Efficiency Retrofits and Upgrades. Establish a target to reduce City government energy use by 10 percent by 2020 and implement cost-effective improvements and upgrades to achieve that target.	**C-1.1:** Adopt a City government energy use target. **C-1.2:** Complete energy audits and benchmarking of all City-owned or -operated facilities, leveraging existing programs, such as PG&E's Automated Benchmarking Service or the U.S. EPA's ENERGY STAR Challenge program. **C-1.3:** Maintain a regular maintenance schedule for heating and cooling, ventilation and other building functions. **C-1.4:** Establish a prioritized list of energy efficiency upgrade projects and implement them as funding becomes available. **C-1.5:** Install an energy management system that monitors energy use and controls heating, cooling, and ventilation to increase efficiency.	Public Works, Community Development	Varies	Medium	39	10 percent energy savings from City government operations by 2020	Near-Term
C-2: City Government Energy Efficient Public Realm Lighting. Continue to	**C-2.1**: Identify and secure funding to replace additional inefficient City-owned or -operated public lighting.	Public Works	Low	Low	8	20 LED street lights, 10 LED traffic	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
replace City-owned or -operated street, traffic signal, park, and parking lot lights with higher efficiency lamp technologies.						signals, and 60 LED or CFL other outdoor lights installed by 2020	
C-3: Energy Efficiency Requirements for New City-owned Buildings. Adopt a policy to exceed minimum Title 24 Building Energy Efficiency Standards by a certain percentage for the construction or renovation of new City buildings and facilities.	**C-3.1:** Adopt a policy to exceed Title 24 building efficiency standards by a 30 percent.	Public Works, Community Development	Low	Very Low	13	25,000 new City-owned or –operated building square feet exceeding State standards by 30 percent by 2020	Mid-Term
C-4: Renewable Energy Systems on City Property. Pursue on-site small-scale renewable energy generation at City government facilities.	**C-4.1:** Identify funding sources and opportunities for City government renewable energy generation. **C-4.2:** Install small-scale solar photovoltaic (PV) systems, solar hot water heaters, or other renewable energy projects at select City government facilities.	Public Works, Community Development	High	Very Low	7	25 kW solar PV installations and 1 solar hot water heater installation by 2020	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
C-5: Transportation Demand Management (TDM) Program for City Employees. Implement a TDM program to reduce annual vehicle miles traveled (VMT) associated with City employee commutes.	**C-5.1:** Establish an ordinance that requires the City to meet employee commute trip VMT reduction targets by offering one or more services from a menu of options, including: encourage the use of the carpools; provide ride matching services and assistance; allow flexible work schedules and telecommuting; provide end of trip facilities (parking, showers, lockers); provide subsidized transit passes; hire a transportation coordinator to manage TDM programs; or others at the employer's discretion. **C-5-2:** Develop, implement, and promote a TDM program for City employees that includes incentives to reduce single-occupancy vehicle trips, such as ride matching services and assistance, flexible work schedules or telecommuting opportunities, end of trip facilities (parking, showers, lockers), subsidized transit passes, etc. **C-5-3:** Participate in and promote annual regional commute trip reduction events.	Community Development, Public Works	Very Low	Low	14	10 percent City employee participation	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
	C-5.4: Hire a transportation coordinator to manage TDM programs. **C-5.5**: Require parking cash-out (a requirement that City employers who subsidize employee parking costs provide an equivalent cash reimbursement for employees who choose not to drive).						
C-6: Zero- and Low-Emission City Fleet Vehicles. Continue to replace official City vehicles and equipment with more efficient and/or alternatively fueled vehicles.	**C-6.1:** Develop and adopt a low- and zero- emissions replacement/purchasing policy for official City vehicles and equipment. This would not apply to vehicles with special performance requirements. **C-6.2:** Work with the Central Coast Clean Cities Coalition to obtain funding to purchase low-emission and zero-emission fleet vehicles. **C-6.3:** Replace 10 vehicles by 2020.	Public Works	Low	Very Low	92	10 municipal vehicles replaced by 2020	Near-Term
C-7: City Government Solid Waste Reduction. Establish a 25 percent solid waste diversion rate over 2005 baseline levels	**C-7.1:** Develop and adopt a City purchasing policy that emphasizes recycled and recyclable materials. **C-7.2:** Install recycling receptacles at City-owned or -	Public Works	Very Low	None	121	50 percent target diversion rate by 2020	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
and identify steps to meet that rate by 2020.	operated buildings and facilities.						
Energy							
Measure E-1: Energy Efficiency Outreach and Incentive Programs. Expand participation in and the promotion of existing energy efficiency programs, such as Energy Upgrade California and San Luis Obispo County Energy Watch, to increase community awareness of existing energy efficiency rebates and financial incentives.	**E-1.1:** Conduct additional outreach and promotional activities, either individually or in collaboration with San Luis Obispo County Energy Watch, targeting specific groups or sectors within the community (e.g., homeowners, renters, businesses, etc.). **E-1.2:** Designate one week per year to conduct an energy efficiency outreach campaign targeting a specific group. The campaign week can also be used to recognize and encourage programs and educational outreach conducted by industry organizations, non-governmental entities, government agencies, and other community groups. **E-1.3:** Direct community members to existing program websites, such as Energy Upgrade California and San Luis Obispo County Energy Watch.	Community Development	Very Low	None	190	40 percent of households participating with 5 percent energy savings and 35 percent of businesses participating with 6 percent energy savings by 2020	Near-Term
Measure E-2: Energy Audit and Retrofit	**E-2.1:** Develop and promote a residential and commercial energy	Community Development	Very Low	None	938	600 households	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
Program. Facilitate voluntary energy assessments, retrofits, and retrocommissioning of residential and commercial buildings within Pismo Beach.	audit program, either individually or in collaboration with San Luis Obispo County Energy Watch, local utilities, and/or neighboring jurisdictions. **E-2.2:** Conduct outreach and promotional activities targeting specific groups (e.g., owners of buildings built prior to Title 24 [1980]) in order to promote the audit and retrofit program. **E-2.3:** As part of the business licensing and renewal process, encourage businesses to participate in the program and receive an energy audit. **E-2.4:** Participate in and promote a single-family residential energy efficiency financing program to encourage investment in energy efficiency upgrades. **E-2.5:** Continue to participate in and promote the AB 811 CaliforniaFIRST energy efficiency financing program for multi-family residential and commercial buildings. **E-2.6:** Work with Energy Upgrade California, local utilities, and/or community businesses and					and 350 businesses audited by 2020, with an average energy savings of 30 percent per retrofit	

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
	organizations, to annually conduct a "do-it-yourself" workshop for building energy retrofits. **E-2.7:** Continue to highlight the effectiveness of energy audits and retrofits by showcasing the success of retrofit projects (e.g., on the City's website or in its newsletter).						
Measure E-3: Income-Qualified Energy Efficient Weatherization Programs. Facilitate energy efficient weatherization of low- and middle-income housing through promotion of existing programs**.**	**E-3.1:** Facilitate and promote existing income-qualified weatherization programs, such as PG&E's Middle Income Direct Install program, either individually or by partnering with a local organization.	Community Development	Very Low	None	63	50 residential units upgraded by 2020	Near-Term
Measure E-4: Incentives for Exceeding Title 24 Energy Efficiency Building Standards. Provide incentives (e.g., priority permitting, reduced permit fees, etc.) for new development and/or	**E-4.1:** Collaborate with community organizations and businesses, local utilities, and other local jurisdictions in the region to develop and promote a technical assistance and best practices program that aids developers in selecting and implementing energy efficiency measures that exceed State	Community Development	Very Low	None	87	50 new or remodeled residences and 25 new non-residential buildings exceeding State standards by	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
major remodels that voluntarily exceed State energy efficiency standards.	standards. **E-4.2:** Identify, provide and promote incentives (e.g., expedited or streamlined permitting, deferred fees, public recognition, etc.) for applicants whose project exceeds State requirements by a specified percent. **E-4.3:** Update building permit process to incentivize higher building performance (e.g. buildings that integrate and optimize major high-performance building attributes, including energy efficiency, durability, and life-cycle performance). **E-4.4:** Launch an educational campaign for builders, permit applicants, and the general public to promote best practices and incentive programs; provide information and assistance about energy efficiency options online and at permit counter.					30 percent by 2020	
Measure E-5: On-Site Small-Scale Solar PV Incentive Program. Facilitate the voluntary installation of on-site	**E-5.1:** Conduct a comprehensive review of the City's solar permitting process based on the Governor's Office of Planning and Research's (OPR) California Solar	Public Works, Community Development	Very Low	None	803	50 commercial solar PV systems installed,	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
small-scale solar PV systems and solar hot water heaters in the community through expanded promotion of existing financial incentives, rebates, and financing programs, and by helping residents and business owners overcome common regulatory barriers and upfront capital costs.	Permitting Guidebook (June 2012), identifying any existing barriers to facility implementation. **E-5.2:** Improve the permit review and approval process for small solar PV systems by implementing recommendations for streamlined permitting identified in the California Solar Permitting Guidebook (e.g., use standardized forms, provide clear written instructions on the permitting process and a checklist of required application materials, make information available on the City's website and at the permit counter, etc.). **E-5.3:** Collaborate with other local jurisdictions in the region to standardize requirements across jurisdiction, by using common promotion and permit materials, such as checklists and standard plans, to reduce permit submittal errors among contractors working throughout a region. **E-5.4:** Participate in and promote a renewable energy financing program to encourage investment in small-scale on-site solar PV					275 residential solar PV systems installed, and 80 residential solar water heaters installed by 2020	

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
	systems. **E-5.5:** Expand education on and promotion of existing incentive, rebate, and financing programs for solar PV systems and solar hot water heaters targeting specific groups or sectors within the community. **E-5.6:** Designate one week per year to conduct a renewable energy outreach campaign targeting a specific group. The campaign week can also be used to recognize community members that have implemented noteworthy or unique renewable energy projects.						
Measure E-6: Income-Qualified Solar PV Program. Facilitate the installation of solar PV systems on and solar hot water heaters in income-qualified housing units by promoting existing programs offered through the California Solar Initiative and New Solar Homes	**E-6.1:** Collaborate with GRID Alternatives and/or other community organizations to provide targeted education and outreach to developers and homeowners about incentives offered through the Single Family Affordable Solar Homes (SASH) Program and the Multifamily Affordable Solar Homes Program (MASH). **E-6.2:** Provide targeted outreach regarding solar water heating	Public Works, Community Development	Very Low	None	49	30 low-income residential solar PV systems installed and 20 low-income residential solar water heaters installed by 2020	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
Partnership and by collaborating with organizations, such as GRID Alternatives, on outreach and eligibility.	incentives offered through the California Solar Initiative, including the SASH and MASH Programs.						
Transportation and Land Use							
Measure TL-1: Bicycle Network. Continue to improve and expand the city's bicycle network and infrastructure.	**TL-1.1:** Continue to pursue public and private funding to expand and link the city's bicycle network in accordance with the General Plan and Bicycle Plan. **TL-1.2:** Annually identify and schedule street improvement and maintenance projects to preserve and enhance the bicycle network. **TL-1.3:** Incorporate bicycle facility improvements into pavement resurfacing, restriping, and signalization operations where the safety and convenience of users can be improved within the scope of work. **TL-1.4:** Coordinate with and support SLOCOG in the implementation of bicycle plans to facilitate non-auto travel within and between communities. **TL-1.5:** Collaborate with the San Luis Obispo Bicycle Coalition to assist with event promotions and	Public Works, Community Development	Very Low	None	687	5 miles of bike lane added by 2020	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
	publications to increase awareness and ridership during Bike Month. **TL-1.6:** Through conditions of approval, require new subdivisions and large developments to incorporate bicycle lanes, routes, and/or shared-use paths into street systems to provide a continuous network of routes, facilitated with markings, signage, and bicycle parking. **TL-1.7:** Continue to enforce mandatory California Green Building Standards Code bicycle parking standards for non-residential development.						
Measure TL-2: Pedestrian Network. Continue to improve and expand the city's pedestrian network.	**TL-2.1:** Continue to pursue public and private funding to expand and link the city's pedestrian network. **TL-2.2:** Continue to expand and promote the Safe Routes to School program.	Public Works, Community Development	Very Low	None	485	5 miles of sidewalk added by 2020	Near-Term
Measure TL-3: Expand Transit Network. Work with the Regional Transit Authority (RTA) and transit service	**TL-3.1:** Work with RTA and transit service providers to implement the Short Range Transit Plan. **TL-3.2:** Work with the San Luis Obispo Regional Transit Authority and local transit agency to identify	Public Works, Community Development	Very Low	None	643	50 percent increase in transit service by 2020	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
providers to expand the local transit network (i.e., additional routes or stops, and/or expanded hours of operation) based on the greatest demand for service.	and map existing and future bus lines (routes) and transit corridors. **TL-3.3:** Support the addition of transit routes that provide intercity express services. **TL-3.4:** Continue to research federal and local funding for transit service upgrade projects. **TL-3.5:** Through the development review process, require new development to provide safe and convenient access to alternative and public transportation within the project area as feasible.						
Measure TL-4: Increase Transit Service Frequency/ Speed. Work with the RTA and transit services providers to increase transit service frequency (i.e., reducing headways) by identifying routes where increased bus frequency would improve service.	**TL-4.1:** Work with RTA and transit service providers to shorten regional service headways (e.g., by purchasing additional buses, re-routing existing buses, etc.) to 30 minutes or shorter at commute peaks subject to passenger load demand. **TL-4.2:** Support streamlined transit services and infrastructure that create a bus rapid transit network on main commute corridors.	Public Works, Community Development	Very Low	None	835	50 percent reduction in headways (increase in frequency) by 2020	Near-Term
Measure TL-5: Transportation Demand Management	**TL-5.1:** Collaborate with San Luis Obispo Ride Share and Ride-On to conduct additional outreach	Community Development, Public Works	Very Low	None	1,825	20 percent of employees	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
(TDM) Incentives. Work with San Luis Obispo Regional Ride Share and Ride-On to conduct additional outreach and marketing of existing TDM programs and incentives to discourage single-occupancy vehicle trips and encourage alternative modes of transportation, such as carpooling, taking transit, walking, and biking.	through event promotions and publications, targeting specific groups or sectors within the community (e.g., employers, employees, students, seniors, etc.). **TL-5.2:** Provide information on and promote existing employer based TDM programs as part of the business licensing and renewal process. **TL-5.3:** Collaborate with San Luis Obispo Ride Share and the San Luis Obispo Bicycle Coalition to assist with event promotions and publications to increase awareness and ridership during Bike Month and Rideshare month. **TL-5.4:** Direct community members to existing program websites (e.g., Ride Share, Ride-On) by providing links on the City's website.					participating in TDM programs with 5 percent capture of residential commute trips to San Luis Obispo	
Measure TL-6: Parking Supply Management. Reduce parking requirements in areas such as the downtown where a variety of uses and	**TL-6.1:** Amend the Municipal Code to reduce parking requirements (e.g., eliminate or reduce minimum parking requirements, create maximum parking requirements, and/or allow shared parking).	Community Development	Very Low	None	940	Net reduction of 500 parking spaces by 2020	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
services are planned in close proximity to each other and to transit.	**TL-6.2:** Establish optional in-lieu fees in place of minimum parking requirements where appropriate.						
Measure TL-7: Public Parking Pricing. Establish market-based pricing for public parking spaces, where appropriate.	**TL-7.1:** Separate parking spaces and associated costs from housing and commercial developments in order to allocate the true cost of parking directly to users. **TL-7.2:** Add meters to public parking spaces, where appropriate, and charge market prices. **TL-7.3:** Set prices to achieve 85 percent utilization on each block face and 90 percent utilization in each off-street lot. **TL-7.4:** Conduct parking occupancy studies to consider priority areas for price increases.	Community Development	Low	High	171	2,000 total public parking spaces where parking pricing would apply, 25% increase in parking prices	
Measure TL-8: Electric Vehicle Network and Alternative Fueling Stations. Continue to work with the APCD, Central Coast Clean Cities Coalition, and neighboring jurisdictions to create	**TL-8.1:** Continue to work with the APCD, Central Coast Clean Cities Coalition, and neighboring jurisdictions to create and implement the electric vehicle readiness plan through expanding the use of alternative fuel vehicles and fueling stations in the community (e.g., through identifying and zoning locations	Community Development	Very Low	None	2,842	5 percent increase in electric vehicles by 2020	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
and implement the electric vehicle readiness plan.	for fueling stations, offering incentives for alternative fuel vehicles, etc.). **TL-8.2:** Provide streamlined installation and permitting procedures for vehicle charging facilities, utilizing tools provided in the electric vehicle readiness plan (e.g., sample charging permits, model ordinances, development guidelines, outreach programs). **TL-8.3:** Pursue funding for plug-in electric vehicle charging stations.						
Measure TL-9: Smart Growth. Facilitate mixed-use, higher density, and infill development near existing or planned transit stops, in existing community centers/downtown, and in other designated areas.	**TL-9.1:** Provide and promote incentives (e.g., parking reductions, priority permitting, etc.) for mixed-use and very high-density development that has a minimum density of 20 dwelling units per acre and is located within ¼-mile of an existing or planned transit stop or park and ride facility with regularly scheduled, daily service. **TL-9.2:** Develop a form-based zoning code for the central business district/downtown. Form-based codes emphasize building form rather than use. This increases flexibility for a variety of	Community Development	Very Low	None	5,816	50 percent of new residential units and new jobs located within ¼-mile of transit, resulting in a 9 percent reduction in VMT by 2020	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
	complementary uses to be permitted in the same area, and the potential for mixed-use development, which helps to reduce vehicle miles traveled.						
Off-Road							
Measure O-1: Off-Road Equipment Upgrades, Retrofits, and Replacements. Continue to work with the APCD and promote existing programs that fund off-road equipment and vehicle upgrades, retrofits, and replacement through the Carl Moyer heavy-duty vehicle and equipment program or other funding mechanisms.	**O-1.1:** Conduct additional outreach and promotional activities targeting specific groups (e.g., agricultural operations, construction companies, homeowners, etc.). **O-1.2:** Direct community members to existing program websites (e.g., APCD, Carl Moyer Grant page).	Community Development	Very Low	None	87	5 percent of off-road vehicles/ equipment replaced with electric-powered vehicles/ equipment and 5 percent replaced with alternative fuel vehicles/ equipment by 2020	Mid-Term
Solid Waste							
Measure S-1: Solid Waste Diversion. Adopt a solid waste diversion rate target that exceeds the state-mandated rate of 50 percent and identify programs to meet the	**S-1.1:** Adopt a solid waste diversion rate of 80 percent (30 percent above the state-mandated rate of 50 percent). **S-1.2:** Identify programs to meet the identified diversion rate (e.g. office recycling programs, purchasing policies, etc.).	Public Works	Very Low	None	908	30 percent solid waste diversion above state mandated 50 percent (i.e., 80 percent	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
identified rate by 2020.	**S-1.3:** Develop an education and outreach program in support of the diversion rate.					diversion) Note: In 2012, the City had a diversion rate of 71 percent	
Tree Planting							
Measure T-1: Tree Planting Program. Facilitate voluntary tree planting within the community, working with local non-profit organizations and community partners.	**T-1.1:** Develop a tree planting assistance program, which provides resources, labor, and subsidies to participating community members. **T-1.2:** Develop and adopt tree planting guidelines that address tree and site selection. Emphasis should be placed on native, drought-tolerant trees. **T-1.3:** Track the number of trees planted annually.	Community Development, Public Works	Low	None	12	1,000 net new trees planted by 2020	Near-Term
Adaptation							
Measure A-1: Climate Change Vulnerability. Identify and periodically reassess regional climate change vulnerabilities.	**A-1.1:** Participate in inter-agency and or inter-jurisdictional meeting and planning activities to identify and periodically reassess regional climate change vulnerabilities. **A-1.2:** Incorporate newly identified adaptation measures into planning documents as appropriate.	Community Development	Very Low	None	NA	NA	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
Measure A-2: Public Health and Emergency Preparedness. Prepare for anticipated climate change effects on public health, the local economy, and populations that may bear a disproportionate burden of the climate change effects.	**A-2.1:** Collaborate with community-based organizations (such as health care providers, public health advocates, fire prevention organizations, etc.) to disseminate public preparedness and emergency response information related to climate change. **A-2.2:** Conduct training exercises at public forums as well as distribute publicly available information on emergency exit routes and methods. **A-2.3:** Identify and focus planning and outreach programs on vulnerable populations including neighborhoods that currently experience social or environmental injustice or bear a disproportionate burden of potential public health impacts.	Community Development, Public Works	Very Low	None	NA	NA	Mid-Term
Measure A-3: Water Management. Implement new policies and programs to limit community exposure to threats such as flooding, and support those that encourage	**A-3.1:** Collaborate with other jurisdictions to address water supply threats, flooding, and wastewater management. **A-3.2:** Continue to seek grants and other sources of funding, including the State Integrated Regional Water Management	Community Development, Public Works	Very Low	None	NA	NA	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
water use conservation and efficiency.	Grant Program and mitigation opportunities, to enhance flood control and improve water quality. **A-3.3:** Encourage the use of recycled water and graywater systems and low-impact development (LID) techniques.						
Measure A-4: Infrastructure. Work to improve the resilience of systems that provide the resources and services critical to community function.	**A-4.1:** Assess the potential impact of climate change as part of the update of plans that manage community infrastructure systems. **A-4.2:** Complete an assessment, including economic impacts and threats to public health and safety, for projected climate change impacts on local transportation, water, wastewater, stormwater, energy, and communication systems. **A-4.3:** Develop mitigation plans for protection of the wastewater treatment facility, the high school, and the relocation or elevation of vulnerable infrastructure.	Community Development, Public Works	Very Low	None	NA	NA	Long-Term
Measure A-5: Coastal Resource Protection. Prepare for anticipated climate change effects on vulnerable coastal resources.	**A-5.1:** Monitor and study specific beach profiles and resource vulnerability. **A-5.2:** Plan for future beach changes by implementing policies and programs to address	Community Development, Public Works	Very Low	None	NA	NA	Long-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame*
	resource vulnerabilities, such as fresh water supplies, beach replenishment and/or artificial dune creation. **A-5.3:** Study measures to implement a program of managed realignment, i.e., setting back the line of actively maintained defenses, thus creating an intertidal habitat to attenuate wave energy and reduce erosion.						

* The phase in which this measure should begin implementation. Please note that measures already underway with existing or recently completed efforts in support of the measure are categorized as near-term.

5.2 Implementation and Monitoring Policies

CAP implementation and monitoring will require City leadership to execute CAP measures and actions, report on the progress of implementation and performance, and if necessary, alter or amend the CAP in the future to ensure that the plan remains effective and on track toward meeting its target. The following policies and actions were developed to guide CAP implementation and monitoring.

I-1: CAP Implementation Team

Establish a CAP Coordinator and multi-departmental CAP Implementation Team to implement, monitor, and report on the status of measures and actions identified in the CAP. The CAP Implementation Team will meet at least one time per year to assess the status of City efforts.

Implementation Actions:

- **I-1.1:** Form a multi-departmental CAP Implementation Team that meets annually to implement, monitor, and report on the status of measures and actions identified in the CAP.
- **I-1.2:** Designate a City staff member on the CAP Implementation Team to have lead responsibilities for overseeing CAP implementation and monitoring. Duties of this position include coordinating the CAP Implementation Team meetings, preparing the annual CAP progress report to City Council, and coordinating the GHG emissions inventory and CAP updates, as specified in this chapter.
- **I-1.3:** Provide CAP implementation and GHG reduction training to staff.

I-2: CAP Measure Evaluation

Annually monitor and report on the implementation and performance of the CAP measures and actions.[1]

Implementation Actions:

- **I-2.1:** Prepare an annual progress report for City Council review and consideration. The progress report should:
    - Identify the implementation status of each measure (including how new development projects have been implementing CAP measures);
    - Evaluate achievement of or progress toward performance criteria;[2]

[1] While a full GHG emissions inventory is necessary to assess community-wide and local government progress toward the 2020 goal, the City can track progress between inventories and provide insight on the effectiveness of specific actions. By evaluating whether the implementation of a measure is on track to achieve its performance criteria, the City can identify successful measures, and re-evaluate or replace under-performing measures.

[2] The performance indicators, provided for each quantified measure, identify the level of participation or performance required to achieve the estimated level of GHG emissions reductions by 2020.

- Assess the effectiveness of measures included in the CAP;
- Report on the State's implementation of state-level measures included in the CAP; and
- Recommend adjustments to actions or tactics, as needed.

I-3: GHG Emissions Inventory and CAP Updates

Re-inventory GHG Emissions every five years to evaluate the performance of the CAP as a whole, and if necessary, alter or amend the CAP to ensure that the plan remains on track.[3]

Implementation Actions:

- **I-3.1:** Conduct a GHG inventory every five years and evaluate CAP performance.
- **I-3.2:** Update the CAP as necessary based on the results of the inventory, and to reflect new programs or policies to reduce GHG emissions.

At this time, the State has not created a mandate for further reductions beyond the 2020 target. It has identified a long-term goal for State agencies of reducing emissions to 80 percent below 1990 emissions levels by 2050 (in Executive Order S-3-05), but has not adopted the target and does not plan for meeting this goal. As such, this CAP does not identify a target beyond 2020. As the year 2020 approaches, the State is likely to adopt a target for later years and, at that time Pismo Beach will adopt a reduction target for a later year consistent with the State's longer-term target. However, if the State has not adopted a reduction target by 2020, the City will set a reduction target based on the State's long-term reduction trajectory.

5.3 Funding Sources

One of the main barriers to an implementation and monitoring plan is lack of available funds. There are multiple grant and loan programs through state, federal, and regional sources to reduce GHG emissions. This section identifies potential funding sources that Pismo Beach could pursue to offset the financial cost of implementing the CAP measures.

The spectrum of public and private funding options for the measures outlined in this CAP is ever evolving. The programs listed below represent the current (2013) status of those options that are most relevant to the CAP. These funding sources could quickly become out-of-date; therefore, it is important to evaluate the status of a given program before seeking funding, as availability and application processes are updated periodically. In addition, there are general sources of funding that provide the most up-to-date information and should be reviewed on a regular basis, including:

[3] Inventory updates provide the best indication of CAP effectiveness as they will allow for comparison to the 2005 baseline. If an update reveals that the plan is not making progress toward meeting the GHG reduction target, the City will adjust the measures as necessary.

- U. S. Department of Energy
- U.S. Environmental Protection Agency
- U.S. Department of Housing and Urban Development
- California Energy Commission
- California Strategic Growth Council
- California Public Utilities Commission
- Caltrans
- CAL FIRE
- California Statewide Communities Development Authority
- Foundation for Renewable Energy and Environment
- SLOCOG
- SoCalGas
- PG&E

To reduce costs and improve the CAP's effectiveness, actions should be pursued concurrently whenever possible. Funding sources the City decides to pursue will be identified as implementation occurs.

The City can, in part, provide funding for various measures outlined in this CAP. This can be accomplished through the City's annual budgeting and Capital Improvement Program process which provides an opportunity for citizen input and guides decision-makers while helping them set priorities. The City can also partner with SLOCOG, local jurisdictions within San Luis Obispo County, community-based organizations, and private companies for joint programs.

5.3.1 ENERGY-RELATED FUNDING SOURCES

Many of the financing and incentive programs relevant to the CAP concern energy infrastructure and conservation. Some of these programs are tied to the American Recovery Reinvestment Act economic stimulus package enacted by Congress in February 2009. Access to these funds will be available for a limited period. The City should seek the most up-to-date information regarding the programs listed below.

Strategic Growth Council Sustainable Communities Planning Grant Program

California Strategic Growth Council

On behalf of the Strategic Growth Council, the Department of Conservation manages competitive grants to cities, counties, and designated regional agencies to promote sustainable community planning and natural resource conservation. The grant program supports development, adoption, and implementation of various planning elements. The Sustainable Communities Planning Grant Program offers a unique opportunity to improve and sustain the wise use of infrastructure and natural resources through a coordinated and collaborative approach.

Urban Greening for Sustainable Communities Grant Program

California Strategic Growth Council

Because of the built-out nature of California's urban areas, the Urban Greening for Sustainable Communities Program provides funds to preserve, enhance, increase, or establish community green areas such as urban forests, open spaces, wetlands, and community spaces (e.g., community gardens). The goal is for these greening projects to incrementally create more viable

and sustainable communities throughout the state. This program has both an Urban Greening Planning Program, which provides funds to assist entities in developing a master urban greening plan, and an Urban Greening Project Program, which provides funds for projects that preserve, enhance, increase or establish community green areas.

Urban and Community Forestry Grant Program

CAL FIRE

The CAL FIRE Urban and Community Forestry Program works to expand and improve the management of trees and related vegetation in communities throughout California. This program offers funding through a variety of grants. The Urban Forest Management Plan Grant funds the development and implementation of a management plan to be used by a jurisdiction to manage its urban forest. Such plans will be holistic and long-term, must include the entire jurisdiction and take an ecosystem management approach, and may include a minimum level of a training or educational component. Local jurisdictions may request between $30,000 and $100,000 and matching contributions totaling 25 percent of the total project cost is required. The Green Trees for the Golden State Grant provides funding for urban tree planting projects and up to two years of initial maintenance. Local jurisdictions may request between $30,000 and $100,000. Matching contributions totaling 25 percent of the total project cost is required.

California Investor Owned Utilities (IOUs) Programs

PG&E

California IOUs, such as PG&E, are required by the CPUC to offer energy efficiency programs to their customers. Each IOU program is unique; generally the programs offer rebates, financing assistance, design assistance, educational seminars, and other forms of assistance. PG&E's rebates may be calculated based on the amount of energy savings or, alternatively, may be fixed rate financial assistance for specific energy efficiency technology.

In conjunction with its rebates and incentives programs, PG&E offers an Energy-Efficiency Retrofit Loan Program, also known as On-Bill Financing. The program for public agencies includes: zero-percent financing on qualifying measures for up to ten years; offsets to energy-efficient upgrade costs after rebates and incentives through PG&E; loans ranging from a minimum of $5,000 up to $250,000 per meter; and loan installments added to monthly PG&E bills.

PG&E also offers the Green Communities and Innovator Pilots energy efficiency programs, which are administrated by PG&E, using funds from the Public Goods Charge (PGC) authorized by the California Public Utility Commission (CPUC). Customers of California's three largest investor-owned utility companies pay the PGC through their electric utility bills. Customers pay the surcharge per unit of consumption (kilowatt-hours). Money raised by the PGC is spent on services and programs deemed to be in the public interest, including energy efficiency initiatives such as Green Communities and Innovator Pilots.

SoCalGas

Southern California Gas Company offers On-Bill Financing with rebates for energy efficient natural gas equipment. For institutional customers, such as the City of Pismo Beach, zero-percent financing is available from $5,000 to $250,000 per meter, with a maximum payback period of 10 years. Monthly loan payments are added directly to the customer's energy bill.

Energy Conservation Assistance Account Program (ECAA) Energy Efficiency Financing

California Energy Commission

The California Energy Commission offers low-interest loans (1-3 percent) to help local jurisdictions and other public agencies finance energy-efficient projects as part of the ECAA Program. Projects with proven energy and/or capacity savings are eligible, provided they meet the eligibility requirements. Examples of projects include: lighting systems, pumps and motors, energy efficient streetlights and traffic signals, automated energy management systems/controls, building insulation, renewable energy generation and combined heat and power projects, heating and air conditioning modifications, and wastewater treatment equipment. The maximum loan amount is $3 million per application for 15 years. There is no minimum loan amount.

California Solar Initiative State Rebate Program

California Energy Commission & California Public Utilities Commission

California Solar Initiative will provide over $2 billion in statewide incentives over the next decade for solar photovoltaic systems, as well as other solar thermal generating technologies, such as water heaters, on existing residential homes, and existing and new commercial, industrial, and agricultural properties. Photovoltaic incentives are available for systems up to one megawatt in size for homeowners, commercial/industrial, government and non-profit customers. The program pays solar consumers an incentive based on system performance.

California Feed-In Tariff

The California feed-in tariff allows eligible customer-generators to enter into 10-, 15- or 20-year standard contracts with their utilities to sell the electricity produced by small renewable energy systems -- up to three megawatts -- at time-differentiated market-based prices. Time-of-use adjustments will be applied by each utility and will reflect the increased value of the electricity to the utility during peak periods and its lesser value during off-peak periods. These tariffs are not available for facilities that have participated in the California Solar Initiative, Self-Generation Incentive Program, Renewables Portfolio Standard, or other ratepayer funded generation incentive programs, including net-metering tariffs. For customers generating renewable energy not covered by the California Solar Initiative or Self-Generation Incentive Program (e.g., biomass or geothermal) the feed-in tariff is applicable. If customers prefer a long-term contract at a fixed price over a financial incentive paid in the short term, feed-in tariffs may be a beneficial financing tool.

5.3.2 TRANSPORTATION-RELATED FUNDING SOURCES

Many federal, state, and regional grant programs are available to fund transportation and infrastructure improvements. The programs listed below represent the current status of the most relevant of these programs.

Livability Grant Programs

Federal Transportation Authority

The Federal Transportation Authority provides resources on sustainable communities and transit oriented development. This includes access to transit oriented development resources and training free of charge to local government employees. The Federal Transportation

Authority's Livable and Sustainable Communities program supports initiatives that demonstrate ways to improve the link between public transit and communities. The Federal Transportation Authority offers a broad selection of Livability Grant Programs that fund projects for accessible, livable, and sustainable communities. In particular, the Bus and Bus Facilities Discretionary Program provides capital assistance for new buses and intermodal transit centers. The New Starts and Small Starts Program supports transit "guideway" capital investments, such as rapid rail, light rail, commuter rail, automated guideway transit, people movers, bus rapid transit, and other high occupancy vehicles. Additionally, the Intercity Bus Program supports transit access to residents in non-urbanized areas.

Alternative and Renewable Fuel and Vehicle Technology Program

California Energy Commission

Assembly Bill 118 created the Alternative and Renewable Fuel and Vehicle Technology Program, within the California Energy Commission. The statute authorizes the Energy Commission to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's GHG reduction goals and reduce our dependence on foreign oil. The statute allows the Energy Commission to use grants, loans, loan guarantees, revolving loans, and other appropriate measures. Eligible recipients include: public agencies, private businesses, public-private partnerships, vehicle and technology consortia, workforce training partnerships and collaboratives, fleet owners, consumers, recreational boaters, and academic institutions. The Energy Commission must prepare and adopt an Investment Plan and convene an Advisory Committee to assist in preparing the Investment Plan. The Energy Commission has an annual program budget of approximately $100 million.

Community-Based Transportation Planning Grant Program

Caltrans

The Community-Based Transportation Planning Grant Program is primarily used to seed planning activities that encourage livable communities. Grants assist local agencies to better integrate land use and transportation planning, to develop alternatives for addressing growth, and to assess efficient infrastructure investments that meet community needs. These planning activities are expected to help leverage projects that foster sustainable economies, increase available affordable housing, improve housing/jobs balance, encourage transit oriented and mixed use development, expand transportation choices, reflect community values, and include non-traditional participation in transportation decision making.

Local Assistance Program

Caltrans

Caltrans' Local Assistance Program oversees more than one billion dollars in federal and state funds annually available to over 600 cities, counties, and regional agencies for the purpose of improving their transportation infrastructure or providing transportation services.

Safe Routes to School Programs

Caltrans

Caltrans administers two separate Safe Routes to School Programs—one state program and

one federal program. Both programs are intended to achieve the same basic goal of increasing the number of children walking and bicycling to school by making it safer for them to do so. Both programs fund qualifying infrastructure projects.

Bicycle Transportation Account

Caltrans

The Bicycle Transportation Account is an annual program providing state funds for city and county projects that improve safety and convenience for bicycle commuters. Caltrans expects to appropriate $7.2 million annually for projects, on a matching basis with local jurisdictions. A wide variety of projects are eligible, including but not limited to new bikeways serving major transportation corridors, new bikeways removing travel barriers, and secure bicycle parking.

Environmental Enhancement and Mitigation Program

Caltrans

The Environmental Enhancement and Mitigation Program offers a total of $10 million each year for grants to local, state, and federal government agencies and to nonprofit organizations for projects to mitigate the environmental impacts caused by new or modified public transportation facilities. Eligible projects must be directly or indirectly related to the environmental impact of the modification of an existing transportation facility or construction of a new transportation facility. Two of the grant categories include Highway Landscaping and Urban Forestry Projects, which are designed to offset vehicular emissions of carbon dioxide through the planting of trees and other suitable plants, and Roadside Recreation Projects, which provide for the acquisition and/or development of roadside recreational opportunities.

Highway Safety Improvement Program

Caltrans

The Highway Safety Improvement Program provides federal funding for work on any public road or publicly owned bicycle/pedestrian pathway or trail that corrects or improves the safety for its users. The program is intended to reduce traffic fatalities and serious injuries on all public roads. Local jurisdictions, such as counties and cities, may apply to Caltrans for funding ranging from $100,000 to $900,000 per project. Federal reimbursements cover up to 90 percent of total project costs. Eligible projects include, but are not limited to, improvements for pedestrian or bicyclist safety, intersection safety improvements, and shoulder widening.

Community Development Block Grant

California Department of Housing and Community Development

The Community Development Block Grant (CDBG) program funds projects and programs that Develop viable urban communities by providing decent housing and a suitable living environment and by expanding economic opportunities, principally for persons of low and moderate income. Federal CDBG Grantees may use funds for activities that include, but are not limited to, acquiring real property; building public facilities and improvements, such as streets, sidewalks, and recreational facilities; and planning and administrative expenses, such as costs related to developing a consolidated plan and managing CDBG funds. The State makes funds available to eligible agencies (cities and counties) through a variety of different grant programs.

Infill Infrastructure Grant Program

California Department of Housing and Community Development

The Infill Infrastructure Grant Program assists in the new construction and rehabilitation of infrastructure that supports higher-density affordable housing and mixed-income housing in locations designated as infill. Eligible applicants include, but are not limited to, localities and public housing authorities.

National Recreational Trails Program

California Department of Parks and Recreation

In California, the National Recreational Trails Program is administered by Department of Parks and Recreation to provide funding to develop recreational trails and related facilities for uses such as bicycling and hiking**.**

Federal Transportation Improvement Program for the San Luis Obispo County Region

SLOCOG

The Federal Transportation Improvement Program (FTIP) is a comprehensive listing of federally funded surface transportation projects in San Luis Obispo County. SLOCOG prepares and adopts the FTIP every two years in close cooperation with stakeholders such as cities and counties. As part of the FTIP, SLOCOG plans for the spending of flexible funding from the federal Surface Transportation Program, which applies to the following types of projects: enhanced transit services, expanding technology, freeway express bus stops, ridesharing, vanpooling, parallel routes along major transportation corridors, and Park-n-Ride lots. SLOCOG selects projects that promote the strategies and policies of the Regional Transportation Plan.

The FTIP also includes the allocation of funding under the state Transportation Development Act (TDA). Each year, SLOCOG disburses approximately $10 million in funding from the TDA toward bicycle and pedestrian infrastructure, traffic calming, and other planning and capital improvement projects in the region.

Infrastructure State Revolving Fund Program

California Infrastructure and Economic Development Bank

The Infrastructure State Revolving Fund Program provides low-cost financing to public agencies for a wide variety of infrastructure projects. Program funding is available in amounts ranging from $250,000 to $10 million, with loan terms of up to 30 years. Interest rates are set on a monthly basis. Eligible project categories include city streets, county highways, state highways, drainage, water supply and flood control, educational facilities, environmental mitigation measures, parks and recreational facilities, port facilities, public transit, sewage collection and treatment, solid waste collection and disposal, water treatment and distribution, defense conversion, public safety facilities, and power and communications facilities.

5.3.3 SOLID WASTE-RELATED FUNDING SOURCES

Beverage Container Recycling Grant and Payment Programs

California Department of Resources Recycling and Recovery (CalRecycle)

CalRecycle administers funding programs to assist organizations with establishing convenient beverage container recycling and litter abatement projects, and to encourage market development and expansion activities for beverage container materials. The Beverage Container Recycling Grant provides funding to local governments, businesses, individuals, and non-profit organizations for projects that implement new programs or enhance existing programs to provide convenient beverage container recycling opportunities in various locations statewide. Eligible projects include, but are not limited to, the following locations: parks and recreational areas, sporting complexes, community events, office buildings, multifamily dwellings, entertainment/hospitality venues, curbside, restaurants, and schools and colleges. CalRecycle issues up to $1.5 million annually for this program. The City/County Payment Program provides a total of $10.5 million in grant funds annually to eligible cities and counties for beverage container recycling and litter abatement activities. Each city is eligible to receive a minimum of $5,000 or an amount calculated by the Department based on per capita, whichever is greater.

5.3.4 OTHER FUNDING SOURCES

Community Assistance Grant

Bureau of Land Management

Funds are available to assist with hazardous fuels treatments, community wildfire protection planning, and education addressing wildfire safety and hazard risk reduction within the wildland-urban interface. Treatments may be focused on both Federal (with prior approval from local Bureau of Land Management field staff) and non-federal lands and aimed toward protecting communities at risk and resource values identified within a Community Wildfire Protection Plan and/or Community Fire Plans with an interdisciplinary and interagency collaborative process.

Wildland Urban Interface Grant

Fish and Wildlife Service

Wildland Urban Interface funds are available for hazard mitigation projects that protect communities at risk of wildfire by reducing hazardous fuels (non-federal lands), developing Community Wildfire Protection Plans (includes associated planning and compliance documents), and implementing wildfire education and outreach initiatives.

Partnerships with Other Jurisdictions and Community Organizations

Partnering with neighboring jurisdictions and community organizations is a key implementation strategy supporting the CAP. Various jurisdictions and organizations within the County could serve as potential partners in implementing the CAP strategies. The City should seek to partner with appropriate local governments, as identified within CAP measures.

CHAPTER 6

REFERENCES AND PREPARERS

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GLOSSARY

OF TERMS

Glossary of Terms

Actions: The steps that will be taken to implement the Climate Action Plan measures.

Adaptation: The ability to adjust to, or minimize, the potential impacts of climate change or other environmental disturbances.

Baseline Emissions: The amount of GHG emissions released in a designated year against which future changes in emissions levels are measured.

Business-as-Usual: A scenario used for the projection of GHG emissions at a future date based on current technologies and regulatory requirements in absence of other reductions.

California Environmental Quality Act (CEQA): A statute that requires state and local agencies to evaluate the environmental impacts of private or public proposed projects they undertake or permit and to avoid or mitigate potentially impacts, if feasible. If a proposed action has the potential for a significant environmental impact, an environmental impact report (EIR) must be prepared and certified before action can be taken.

Carbon Dioxide (CO_2): A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal anthropogenic GHG that affects the Earth's radiative balance. It is the reference gas against which other GHGs are measured and therefore has a Global Warming Potential of 1.

Carbon Dioxide Equivalent (CO_2e): A metric used to compare the emissions from various greenhouse gases based upon their global warming potential, or potency. Carbon dioxide equivalents are commonly expressed as "metric tons of carbon dioxide equivalents" (MT CO_2e). The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated global warming potential. For example, the global warming potential for methane is 21. This means that one metric ton of methane is equivalent to 21 metric tons of carbon dioxide.

Carbon Sequestration: The process through which agricultural and forestry practices remove carbon dioxide from the atmosphere. The term “carbon sinks” is also used to describe agricultural and forestry lands that absorb carbon dioxide.

Chlorofluorocarbons (CFCs): A family of inert, nontoxic, and easily liquefied chemicals used in refrigeration, air conditioning, packaging, insulation, or as solvents and aerosol propellants. Because CFCs are not destroyed in the lower atmosphere, they drift into the upper atmosphere, where their chlorine components destroy ozone.

Climate: Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years. The classical period is three decades, as defined by the World Meteorological Organization. These quantities

are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.

Climate Action Plan: A description of the measures and actions that a local government will take to reduce GHG emissions and achieve an emissions reduction target. Most plans include a description of existing and future year emissions; a reduction target; a set of measures, including performance standards, that will collectively achieve the target; and a mechanism to monitor the plan and require amendment if it is not achieving specified levels. Interchangeable with GHG Reduction Plan.

Climate Change: Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from: natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun; natural processes within the climate system (e.g. changes in ocean circulation); human activities that change the atmosphere's composition (e.g. through burning fossil fuels) and the land surface (e.g. deforestation, reforestation, urbanization, desertification, etc.).

Co-Benefit: Additional benefits that occur as a result of GHG reduction measures. These include financial savings, improved air quality, increased health or safety, natural resource conservation, reduced energy use, etc.

Connectivity: A well connected circulation system with minimal physical barriers that provides continuous, safe, and convenient travel for all users of streets, roads, and highways.

Emissions: The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere.

Emissions Factor: A set of coefficients used to convert data provided on energy use and energy use reductions to emissions. These emission factors are the ratio of emissions of a particular pollutant (e.g., carbon dioxide) to the quantity of the fuel used (e.g., kilograms of coal). For example, when burned, 1 ton of coal = 2.071 tons of CO_2.

Emissions Forecast: The projected emissions that would occur in a future year based on growth multipliers applied to the baseline year.

Energy Conservation: Reducing energy consumption. Energy conservation can be achieved through energy efficiency (getting the most productivity from each unit of energy) or by reduced use of energy such as turning off appliances when not in use.

Energy Efficiency: Using less energy to provide the same level of service or complete the same task. For example, a more efficient light will use less electricity to provide the same amount of illumination.

Fossil Fuel: A general term for combustible geologic deposits of carbon, including coal, oil, natural gas, oil shale, and tar sands. These fuels emit carbon dioxide into the atmosphere when burned, thus significantly contributing to the enhanced greenhouse effect.

Fuel Efficiency: The distance a vehicle can travel on an amount of fuel. This is most often measured in miles traveled per gallon of fuel. A higher-efficiency vehicle travels farther on a gallon of fuel than similar vehicles.

Global Warming: Global warming is an average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common usage, "global warming" often refers to the warming that can occur as a result of increased emissions of GHGs.

Green Building: Green, or sustainable, building is the practice of creating and using healthier and more resource-efficient models of construction, renovation, operation, maintenance and demolition.

Greenhouse Effect: Trapping and build-up of heat in the atmosphere (troposphere) near the Earth's surface. Some of the heat flowing back toward space from the Earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then reradiated back toward the Earth's surface. If the atmospheric concentrations of these GHGs rise, the average temperature of the lower atmosphere will gradually increase.

Greenhouse Gas (GHG): Any gas that absorbs infrared radiation in the atmosphere. GHGs include, but are not limited to, water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), ozone (O_3), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Greenhouse Gas Emissions Inventory: A GHG emissions inventory provides estimates of the amount of GHGs emitted to and removed from the atmosphere by human activities. A city or county that conducts an inventory looks at both community emission sources as well as emissions from government operations. A base year is chosen and used to gather all data from that year. Inventories include data collection from such things as vehicle miles traveled (VMTs), energy usage from electricity and gas, and waste. Inventories include estimates for carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydroflourocarbons (HFCs), and perflourocarbons (PFCs), which are referred to as the "six Kyoto gases."

Hydrofluorocarbons (HFCs): Man-made compounds containing hydrogen, fluorine, and carbon, many of which have been developed as alternatives to ozone-depleting substances for industrial, commercial, and consumer products, that have a range of global warming potentials. HFCs do not have the potential to destroy stratospheric ozone, but they are still powerful GHGs.

Infill Site: A site in an urbanized area that meets criteria defined in Public Resources Code Section 21061.3.

Intergovernmental Panel on Climate Change (IPCC): The IPCC was established jointly by the United Nations Environment Program and the World Meteorological Organization in 1988. The purpose of the IPCC is to assess information in the scientific and technical literature related to all significant components of the issue of climate change. The IPCC draws upon hundreds of the world's expert scientists as authors and thousands as expert reviewers. Leading experts on climate change and environmental, social, and economic sciences from some 60 nations have helped the IPCC to prepare periodic assessments of the scientific underpinnings for understanding global climate change and its consequences. With its capacity for reporting on climate change, its consequences, and the viability of adaptation and mitigation measures, the IPCC is also looked to as the official advisory body to the world's governments on the state of the science of the climate change issue. For example, the IPCC organized the development of internationally accepted methods for conducting national GHG emission inventories.

Kilowatt (kW): One thousand watts.

Kilowatt-hour (kWh): an amount of electricity equivalent to the use of one kilowatt for one hour. A hundred watt light bulb that is on for 10 hours uses one kilowatt-hour of electricity (100 watts x 10 hours = 1,000 watt-hours = 1 kilowatt-hour). Electricity production or consumption is often expressed as kilowatt- or megawatt-hours produced or consumed during a period of time.

Methane (CH_4): A hydrocarbon that is a GHG with a global warming potential estimated at 21 times that of carbon dioxide (CO_2). Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.

Measure: A way to reduce GHG emissions.

Metric Ton (MT): Common international measurement for the quantity of GHG emissions. A metric ton is equal to 2,205 pounds or 1.1 short tons.

Mitigation: An action to either reduce the amount of GHGs being emitted into the atmosphere or remove previously emitted gases from the atmosphere.

Mixed-Use: Mixed Use development means combining a variety of compatible land uses in a single development, and can be creatively used to create vibrant centers for living, working, and shopping. The primary purpose of the Mixed-Use land use designations is to implement the principals of smart growth by applying the designation to certain areas along the City's main transportation corridors that could successfully support a combination of uses (multi-family residential, retail, office uses, etc.) within a single development plan.

Natural Gas: Underground deposits of gases consisting of 50 to 90 percent methane and small amounts of heavier gaseous hydrocarbon compounds such as propane and butane.

Perfluorocarbons (PFCs): Potent GHGs that accumulate in the atmosphere and remain there for thousands of years. Aluminum production and semiconductor manufacture are the largest known man-made sources of perfluorocarbons.

Recycling: Collecting and reprocessing a resource so it can be used again. An example is collecting aluminum cans, melting them down, and using the aluminum to make new cans or other aluminum products.

Renewable Energy: Energy generated from sources that are naturally replenished or not used up in the course of providing power (e.g., wind, solar, biomass, and geothermal).

Retrofit: The addition of new technology or features to older systems. For example, adding new energy-efficient lamps to existing lighting fixtures.

Sector: A term used to describe GHG emission inventory source categories for GHGs based on broad economic sectors.

Smart Growth: A compact, efficient, and environmentally sensitive pattern of development that provides people with additional travel, housing, and employment choices by focusing future growth closer to existing and planned job centers and public facilities, while preserving open space and natural resources.

Solar Photovoltaic (PV): A system that converts sunlight directly into electricity using cells made of silicon or other conductive materials. When sunlight hits the cells, a chemical reaction occurs, resulting in the release of electricity.

Source: Any process or activity that releases a GHG into the atmosphere.

Target Year: The year by which the GHG emissions reduction target should be achieved.

Transportation Demand Management (TDM): A general term for strategies that increase overall system efficiency by encouraging a shift from single-occupant vehicle trips to non-single-occupant vehicle modes, or shifting auto trips out of peak periods. TDM seeks to facilitate this shift by increasing travel options, by providing incentives and information, or by reducing the physical need to travel through transportation-efficient land uses.

Vehicle-Miles Traveled (VMT): One vehicle traveling the distance of one mile. Total vehicle miles is the aggregate mileage traveled by all vehicles. VMT is a key measure of overall street and highway use. Reducing VMT is often a major objective in efforts to reduce vehicular congestion and achieve air quality goals.

APPENDIX A

GHG EMISSIONS INVENTORY

CITY OF PISMO BEACH

Community-Wide and Government Operations Greenhouse Gas Emissions Inventory Update

Prepared for:

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APPENDICES

Appendix A: CACP2009 Detailed Report for Community-Wide Emissions, 2005

Appendix B: CACP2009 Detailed Report for City Government Operations Emissions, 2005

Appendix C: Detailed Methodology for Community-Wide Inventory

Appendix D: Detailed Methodology for City Government Operations Inventory

Appendix E: City Employee Commute Survey, 2009

GREENHOUSE GAS EMISSIONS INVENTORY UPDATE

Executive Summary

A greenhouse gas (GHG) emissions inventory identifies the major sources and quantities of GHG emissions produced by community activities and City government facilities and operations within a jurisdiction's boundaries for a given year. Estimating GHG emissions enables local governments to establish an emissions baseline, track emissions trends, identify the greatest sources of GHG emissions within their jurisdiction, set targets for future reductions, and create an informed mitigation strategy based on this information.

This Inventory includes a 2005 baseline inventory of GHG emissions from community activities and City government facilities and operations within the city[1], and a 2020 business-as-usual forecast of how emissions in Pismo Beach would change if no further actions are implemented to reduce those emissions. It is important to note that the City government operations inventory is a subset of the community inventory, meaning that the city government's emissions are included within the community inventory.

The community inventory is divided into six sectors, or sources of emissions: transportation, residential energy use, commercial and industrial energy use, solid waste, off-road vehicles and equipment, and wastewater. The City government inventory provides a more detailed analysis of emissions resulting from City-owned or -operated buildings, fleet vehicles, and lighting; water and sewage transport; City-generated solid waste; and employee commute travel.

What are Greenhouse Gas Emissions (GHGs)?

Gases that trap heat in the Earth's atmosphere are called greenhouse gases, or GHGs. Greenhouse gases include carbon dioxide, methane, nitrous oxide, and fluorinated gases. While many of these gases occur naturally in the atmosphere, modern human activity has led to a steep increase in the amount of GHGs released into the atmosphere over the last 100 years. Collectively, these gases intensify the natural greenhouse effect, thus causing global average surface temperatures to rise, which in turn affects global climate patterns. GHGs are often quantified in terms of CO_2 equivalent, or CO_2e, a unit of measurement that equalizes the potency of GHGs.

Source: Intergovernmental Panel on Climate Change (IPCC), 2007

GHG EMISSIONS INVENTORY UPDATE

In 2010, PMC prepared an inventory of Pismo Beach's 2005 community-wide and City government emissions. Changes to GHG accounting protocols have prompted an update to the

[1] In this report, the term "city" refers to the area inside the jurisdictional boundary of the City of Pismo Beach, whereas "City government" refers to those activities which are under the operational control of City agencies.

emissions inventory and in 2012 Rincon Consultants conducted a peer-review and update to the Inventory. This Inventory is the updated assessment of GHG emissions in Pismo Beach.

Rincon updated the Inventory methodology, emissions coefficients, and data for consistency with current protocols, including the Local Government Operations Protocol (LGOP) version 1.1 (May 2010), for the city government inventory, and the Association of Environmental Professionals (AEP) California Community-wide GHG Baseline Inventory Protocol (AEP Protocol) (June 2011) and ICLEI International Local Government GHG Emissions Analysis Protocol (IEAP) (October 2009), for the community-wide inventory. Rincon also updated the Inventory to include all emissions sectors within the discretionary action authority of the City. The primary additions and revisions to the updated Inventory include the following:

- Calculation of emissions from additional off-road vehicle and equipment categories (lawn and garden equipment, construction equipment, industrial equipment, and light commercial equipment) for the community-wide inventory.
- Incorporation of improved emissions factors from the LGOP version 1.1.
- Incorporation of a refined methodology for on-road transportation emissions. The 2012 methodology estimates vehicle miles traveled (VMT) based on an origin-destination approach using the regional travel demand model and excludes vehicle trips that pass through the city. Transportation-related GHG emissions were then calculated using the California Air Resources Board Emissions Factor 2011 (EMFAC2011) software.
- Corrections to baseline electricity and natural gas consumption data, and waste stream profile data.
- Inclusion of updated population and employment projections using the San Luis Obispo Council of Governments' (SLOCOG) 2040 Population, Housing & Employment Forecast (August 2011).[2]

As a result of the Inventory update, Pismo Beach's community-wide 2005 baseline emissions increased by 22,400 metric tons CO_2e and 2020 forecast increased by 38,415 metric tons CO_2e compared to the July 2010 inventory.

[2] SLOCOG's 2040 Population, Housing & Employment Forecast includes population and employment projections developed based on an analysis of historic growth and economic trends. See *San Luis Obispo County 2040 Population, Housing & Employment Forecast* (August 2011) for details.

COMMUNITY-WIDE GHG INVENTORY RESULTS

The community of Pismo Beach emitted approximately 87,077 metric tons of carbon dioxide equivalent (CO_2e) in the baseline year 2005. As shown in **Figure ES-1** and **Table ES-1**, the transportation sector was by far the largest contributor to emissions (59.5%), producing approximately 51,811 metric tons of CO_2e in 2005. Transportation sector emissions are the result of diesel and gasoline fuel used in vehicles traveling on local roads and state highways within the jurisdictional boundaries of Pismo Beach. Emissions from electricity and natural gas consumed in the commercial and industrial sectors combined were the next largest contributor (17.2%), producing approximately 14,958 metric tons of CO_2e. The residential sector accounted for 17.0% of the total. Emissions from landfilled solid waste comprised 4.0% of the total, and emissions from other sources such as off-road vehicles and equipment comprised and methane emissions from wastewater treatment processes comprised the remaining 2.3%.

FIGURE ES-1: COMMUNITY GHG EMISSIONS BY SECTOR, 2005

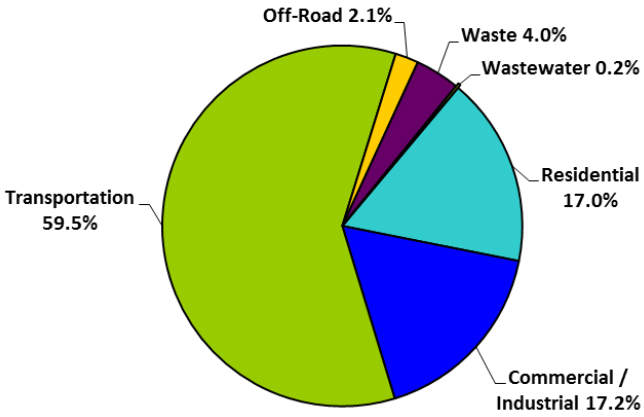


TABLE ES-1: COMMUNITY GHG EMISSIONS BY SECTOR, 2005

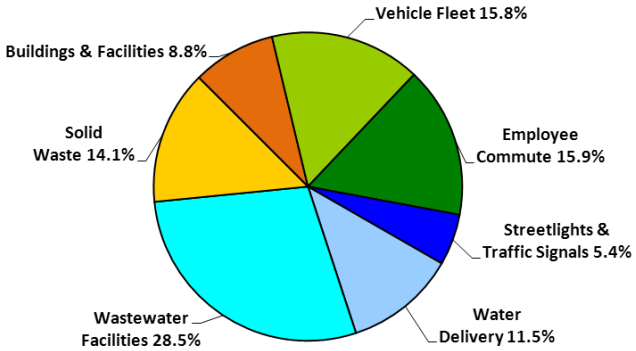
2005 Community Emissions by Sector	Residential	Commercial/ Industrial	Transportation	Off-Road	Waste	Wastewater	TOTAL
CO_2e (metric tons)	14,808	14,958	51,811	1,821	3,479	200	87,077
Percentage of Total CO_2e	17.0%	17.2%	59.5%	2.1%	4.0%	0.2%	100%

CITY GOVERNMENT OPERATIONS GHG INVENTORY RESULTS

City government operations and facilities produced approximately 1,897 metric tons of CO_2e in 2005. As displayed in **Table ES-2** and **Figure ES-2**, this represents approximately 2.2% of total community-wide emissions in the city. City government emissions result from waste, energy consumption from water and wastewater facilities, buildings, streetlights and other facilities, fuel consumption by the vehicle fleet and employee commutes, and miscellaneous equipment. The largest contributor to the City's emissions (28.5%) was from the wastewater facilities, which produced 540 metric tons of CO_2e. Employee commute then the vehicle fleet were the second and third largest contributors to the City's emissions (15.9% and 15.8% respectively), producing 301 and 300 metric tons of CO_2e (refer to **Figure ES-3** and **Table ES-2**).

FIGURE ES-2: CITY GOVERNMENT PORTION OF COMMUNITY-WIDE EMISSIONS

FIGURE ES-3: CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SECTOR, 2005



City government operations emissions are a subset of the total community-wide emissions as outlined above. However, similar to the way in which businesses and factories perform their own facility-scale GHG Inventories, this Inventory analyzes City emissions separately to identify opportunities for cost-savings and emissions-reductions in the future. The methodology for estimating emissions from local government operations is guided specifically by the Local Government Greenhouse Gas Inventory Protocol developed by the California Air Resources Board, LGOP version 1.1, and the California Climate Registry.

TABLE ES-2: CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SECTOR, 2005

2005 Emissions by Sector	Buildings & Facilities	Vehicle Fleet	Employee Commute	Street Lights & Traffic Signals	Water Delivery	Waste-water Facilities	Solid Waste	TOTAL
CO_2e (metric tons)	166	300	301	102	221	540	267	1,897
Percentage of CO_2e	8.8%	15.8%	15.9%	5.4%	11.5%	28.5%	14.1%	100.0%

DATA LIMITATIONS

This Inventory captures the major sources of greenhouse gases caused by activities within the city per standard practice. However, it is important to note that some likely emission sources were not included in the Inventory, either because of privacy laws, lack of data, or a lack of reasonable methodology for calculating emissions. It is estimated that the sources not included in the inventory comprise less than 5.0% of total emissions in the city. It is likely that as greenhouse gas inventories become more common, methodology and accessibility to data will improve.

The sources that could not be included due to privacy laws, lack of data availability, and/or a reasonable methodology include the following:

- Refrigerants from City government operations facilities and vehicles, and the community-at-large;
- Freight and passenger trains;
- Propane, wind or solar energy consumed by the community-at-large; and
- Residential septic tanks systems.

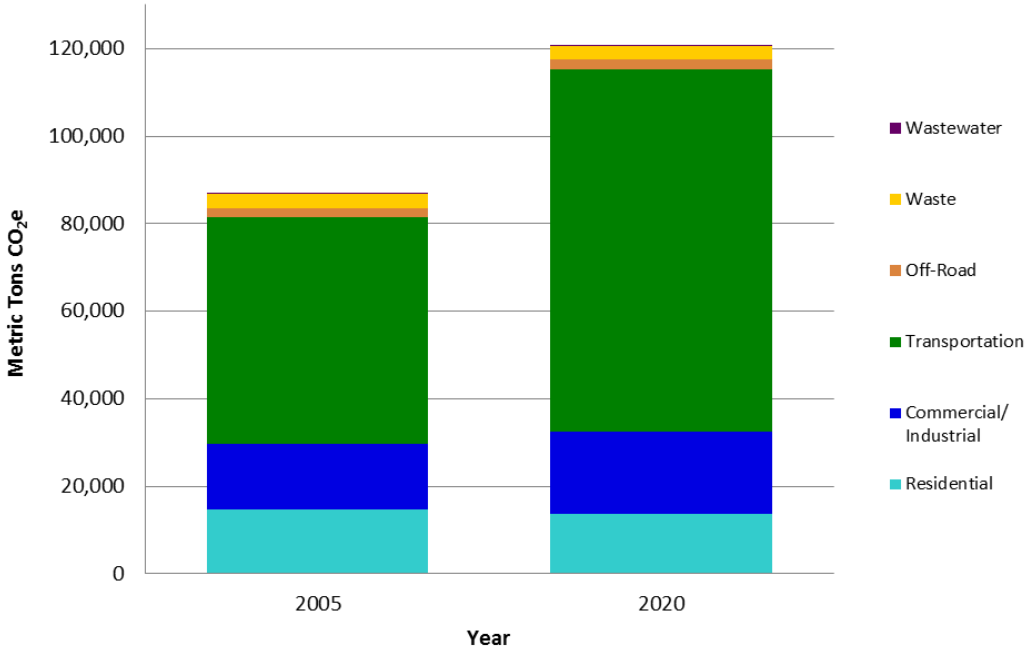
These limitations are explained further in this document.

BUSINESS-AS-USUAL FORECAST

The GHG emissions forecast provides a "business-as-usual estimate," or scenario, of how emissions will change in the year 2020 if consumption trends and behavior continue as they did in 2005, absent any new federal, state, regional, or local policies or actions that would reduce emissions. The year 2020 was selected for the forecast in order to maintain consistency with AB 32.

As shown in **Figure ES-4** and **Figure ES-5,** if consumption trends continue the pattern observed in 2005 (i.e., under business-as-usual conditions), emissions will reach 120,801 metric tons of CO_2e by 2020, or a 38.7% increase over 2005 baseline levels (projections based on population and employment growth).

FIGURE ES-4: 2020 CITY OF PISMO BEACH BUSINESS-AS-USUAL GHG EMISSIONS FORECAST



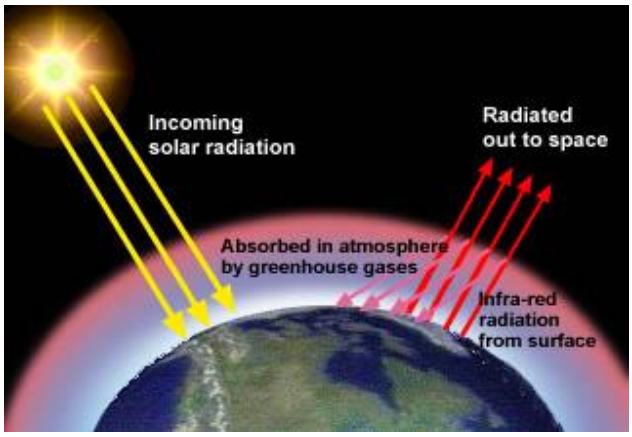
1. Introduction

This section introduces the Inventory, defines key terms used throughout the Inventory, and provides an overview of climate change science and regulation in California.

1.1 PURPOSE OF A GHG INVENTORY

This Inventory represents completion of the first step in the City's climate protection process. Quantifying recent-year emissions is essential to establish: (1) a baseline against which to measure future emission levels, and (2) an understanding of where the highest percentages of emissions are coming from, and, therefore, the greatest opportunities for emissions reductions. This Inventory presents estimates of greenhouse gas emissions in 2005 resulting from the community as a whole.

FIGURE 1-1: THE GREENHOUSE EFFECT



Source: Tufts University

Climate Change – Background

Scientific consensus holds that the world's population is releasing greenhouse gases faster than the earth's natural systems can absorb them. These gases are released as byproducts of fossil fuel combustion, waste disposal, energy use, land-use changes, and other human activities. This release of gases, such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), creates a blanket around the earth that allows light to pass through but traps heat at the surface preventing its escape into space (**Figure 1-1**). Known as the greenhouse effect, models show that this phenomenon could lead to a 2^oF to 10^oF temperature increase over the next 100 years. The Intergovernmental Panel on Climate Change (IPCC) warns that most of the warming observed over the last 50 years is attributable to human activities.[3]

Although used interchangeably, there is a difference between the terms "climate change" and "global warming." According to the State, climate change refers to "any long-term change in

[3] Intergovernmental Panel on Climate Change. Fourth Assessment Report, Working Group I. 2007. Climate Change 2007: The Physical Science Basis, Summary for Policy Makers.

average climate conditions in a place or region, whether due to natural causes or as a result of human activities.[4] The use of the term "climate change" is becoming more prevalent because it encompasses all changes to the climate, not just temperature. Additionally, the term "climate change" conveys temporality, implying that climate change can be slowed with the efforts of local, regional, state, national, and world entities.

Changes in the earth's temperature will have impacts for residents and businesses in the City of Pismo Beach. Some of the major impacts to the Central Coast expected to occur include the following, separated by sector.[5] [6]

- Coastline: The City of Pismo Beach coastline could face inundation as a result of sea level rise and global warming. As temperatures rise, the ocean waters rise as well due to thermal expansion and the melting of glaciers and snowpack. The state's 2009 Climate Change Impacts Assessment (the 2009 Scenarios Project) estimates that sea levels will rise by 12 to 18 inches by 2050 and 21 to 55 inches by 2100. This level of sea rise has the potential to negatively affect groundwater salination as well as the size and attractiveness of local beaches, which could affect property values and the tourism industry in the city;

- Reduced Water Supply: The 2009 Scenarios Project estimates a decrease in precipitation of 12 to 35% by 2050. Higher temperatures may increase evaporation and make for a generally drier climate. In addition, more precipitation will fall as rain rather than snow, which will cause snow to melt earlier in the year and not in the warmer, drier months when water is in higher demand;

- Public Health: Climate change could potentially threaten the health of residents of Pismo Beach. Heat waves are expected to have a major impact on public health. There is also expected to be an increase in allergenic plant pollen and an increase in the frequency of wildfires.

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[4] California Natural Resources Agency. 2009 California Climate Adaptation Strategy Discussion Draft. August 2009.

[5] California Climate Change Center. Our Changing Climate: Assessing the Risks to California (2006), www.climatechange.ca.gov

[6] Governor's Office of Planning and Research (OPR). Proposed CEQA Guideline Amendments for Greenhouse Gas Emissions. April 2009.

Although one city cannot resolve the issue of climate change, local governments can make a positive impact through cumulative local action. Cities and counties have the ability to reduce greenhouse gas emissions through effective land use and transportation planning, wise waste management, and the efficient use of energy. The City can achieve multiple benefits including lower energy bills, improved air quality, economic development, reduced emissions, and better quality of life through:

- Energy efficiency in City facilities and vehicle fleet;
- Sustainable purchasing and waste reduction efforts;
- Land use and transportation planning; and
- Efficient management of water resources.

This Inventory serves as a baseline measurement for implementing and tracking the effectiveness of these efforts.

1.2 CLIMATE CHANGE – LEGISLATIVE BACKGROUND

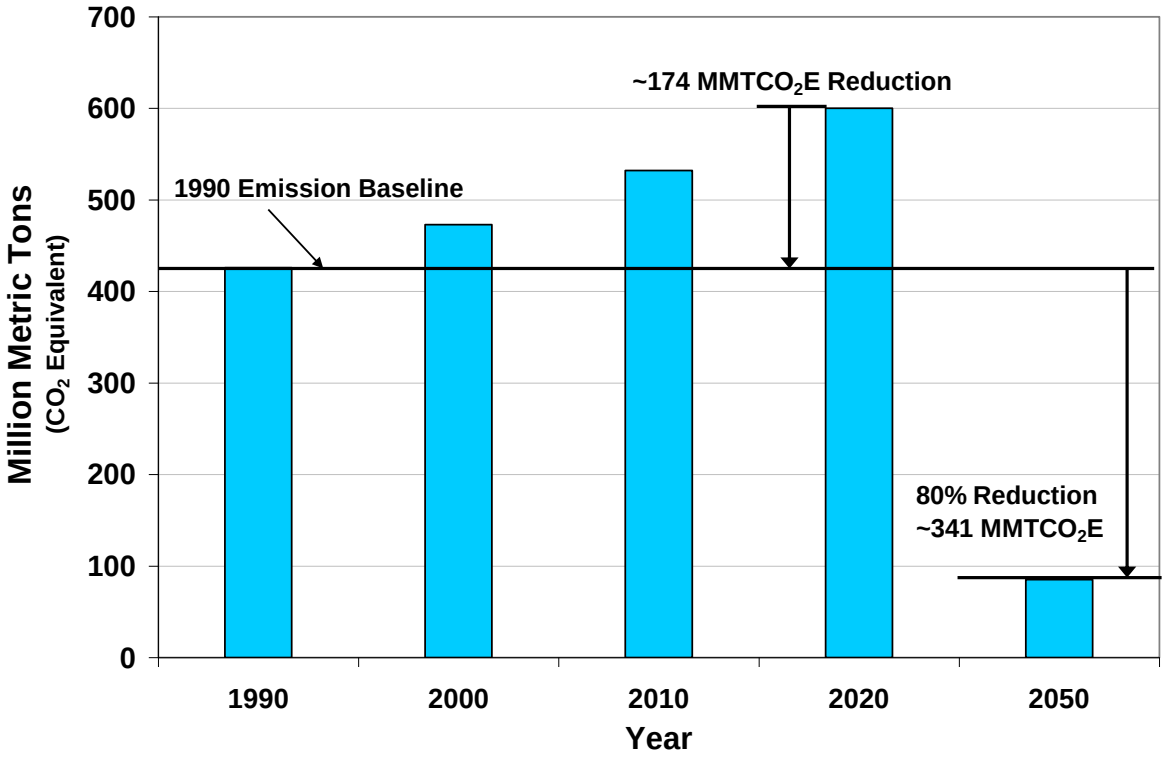
California continues to be a leader in addressing climate change in the United States and in the world. In June of 2005, Governor Schwarzenegger issued a landmark Executive Order establishing progressive greenhouse gas emissions targets for the entire state. Executive Order (EO) S-3-05 makes the following goals:

- By 2010, reduce greenhouse gas emissions to 2000 levels;
- By 2020, reduce greenhouse gas emissions to 1990 levels;
- By 2050, reduce greenhouse gas emissions to 80% below 1990 levels.

To support these reduction targets, the California legislature adopted the California Global Warming Solutions Act of 2006, also known as Assembly Bill (AB) 32. The law requires the California Air Resources Board (CARB) to develop regulatory and market mechanisms that will reduce greenhouse gas emissions to 1990 levels by 2020 as shown in **Figure 1-2** below. To achieve this goal, CARB developed a set of early action measures in 2007 for priority implementation in 2010. These early action measures became part of the AB 32 implementation plan, or Scoping Plan, approved in December 2008. The Scoping Plan identifies a variety of GHG reduction activities including direct regulations, monetary and non-monetary incentives, voluntary actions, market-based mechanisms such as a cap-and-trade, and an implementation

fee regulation to fund the program. The Scoping Plan also identifies local governments as "essential partners" and calls for cities and counties to adopt GHG reduction targets consistent with AB 32.

FIGURE 1-2: CALIFORNIA GHG EMISSIONS AND TARGETS



In support of the AB 32 reduction targets, California adopted Senate Bill (SB) 97 in August 2007, which formally acknowledges that climate change is an important environmental issue that requires analysis under the California Environmental Quality Act (CEQA). In response to SB 97, the Governor's Office of Planning and Research (OPR) submitted their proposed amendments to the CEQA Guidelines for greenhouse gas emissions in April 2009. These amendments provide guidance to public agencies regarding the analysis of mitigation and the effects of GHG emissions in CEQA documents. The Natural Resources Agency adopted the amendments in December 2009.[7]

[7] Governor's Office of Planning and Research (OPR). Proposed CEQA Guideline Amendments for Greenhouse Gas Emissions. April 2009.

At the same time, the State is working to form regional approaches to reducing greenhouse gas emissions in response to the passage of Senate Bill 375. SB 375 aims to reduce greenhouse gas emissions by linking transportation funding to land use planning. It also requires Metropolitan Planning Organizations, including the San Luis Obispo Council of Governments, to include a Sustainable Communities Strategy (SCS) in their Regional Transportation Plans (RTPs) for reducing suburban sprawl. The bill also creates incentives for implementation of sustainable communities strategies and sustainable transportation plans. Additional efforts are under way to affect the overall transportation sector by mandating fewer emissions from vehicles, including Assembly Bill 1493, signed into law in 2002, which will require carmakers to reduce emissions from new passenger cars and light trucks beginning in 2009. US Environmental Protection Agency (EPA) approved the new emissions standards in June 2009.

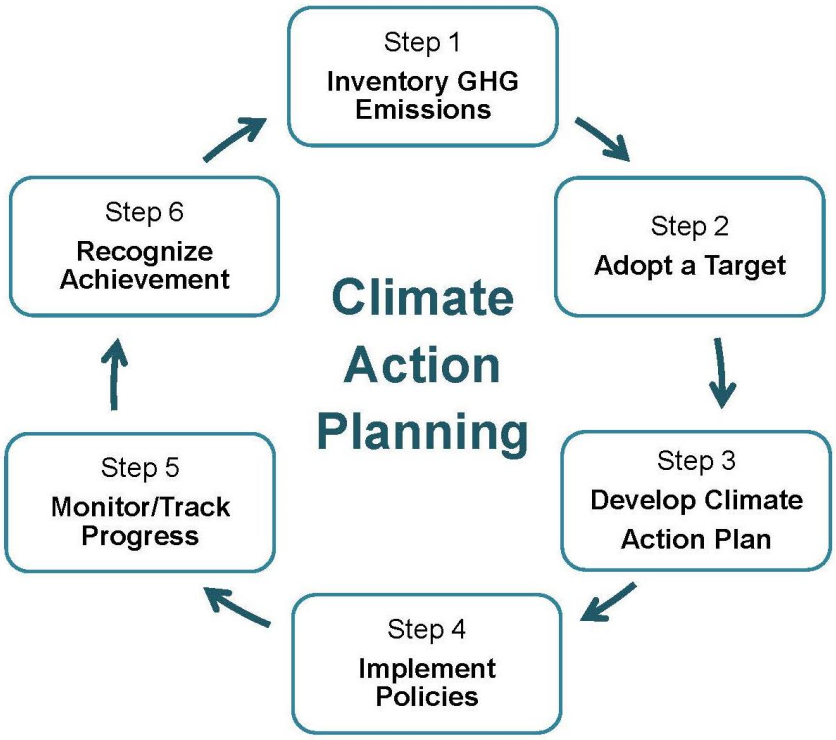
The State is also preparing for climate change resiliency in order to adapt to the inevitable effects of climate change. In November 2008, Governor Schwarzenegger signed Executive Order S-13-08 which asked the Natural Resources Agency to identify how state agencies can respond to rising temperature, changing precipitation patterns, sea level rise, and extreme natural events. The order requires the Natural Resources Agency to develop a Climate Adaptation Strategy (CAS) to analyze climate change impacts to the state and recommend strategies to manage those threats. The Natural Resources Agency released a discussion draft of the CAS in August 2009.

1.3 PLANNING PROCESS

The California Air Resources Board (ARB) provides a framework for local communities to identify and reduce GHG emissions, organized along six steps as represented in **Figure 1-3** below.[8]

[8] California Air Resources Board. Local Government Toolkit, http://www.coolcalifornia.org/local-government

FIGURE 1-3: PLANNING PROCESS



This report represents the completion of the first step, and provides a foundation for future work to reduce greenhouse gas emissions in the City of Pismo Beach.

1.4 LOCAL SUSTAINABILITY AND CLIMATE CHANGE MITIGATION ACTIVITIES

Many of the air pollution programs already in place throughout San Luis Obispo County reduce ozone forming pollutants and toxic emissions, but they also have ancillary benefits and reduce greenhouse gas emissions. The County, cities, and the Air Pollution Control District (APCD) implement rules and regulations, clean fuels programs, CEQA mitigation measures, grants, the Transportation Choices Program, pollution prevention activities, energy efficiency and conservation measures, water conservation programs, partnerships, and general public outreach that directly or indirectly address climate change and reduce greenhouse gas emissions.

The APCD Board approved the first report or plan to address climate change in the county. The plan, (Options for Addressing Climate Change in San Luis Obispo County (2005)) identifies the following seven actions that could be implemented to specifically address greenhouse gases (GHG) at the local level:

1) Prepare a countywide inventory of greenhouse gas emissions;

2) Target a percentage of mitigation grant funds for greenhouse gas emission reductions;

3) Evaluate and quantify the GHG reduction benefits from existing district programs;

4) Develop public education and outreach campaigns on climate change;

5) Encourage and provide support for local governments to join the Cities for Climate Protection program;

6) Develop partnership with Cal Poly for addressing climate change; and

7) Join the California Climate Registry and encourage local industry participation.

As of November 2008, the APCD has initiated, promoted, or supported all of the implementation actions to address climate change and reduction of greenhouse gas emissions in the county. The APCD joined the California Climate Registry and conducted its greenhouse gas emissions inventory in the fall of 2008. The APCD facilitates regular meetings of Climate Change Stakeholders, a local group of city and county representatives that shares resources to address climate change. To encourage and support local greenhouse gas emissions inventories, the APCD is providing technical assistance to all of the incorporated cities to assist or perform GHG government operations and community-wide emissions inventories, similar to this Inventory, for all of the incorporated cities in San Luis Obispo County.

The APCD also coordinates the Central Coast Clean Cities Coalition (C5). C5 is a partnership of public/private entities whose goal is to promote the use of alternative fuels vehicles (AFV) on the Central Coast. By working with area fleet operators, C5 sponsors training seminars, public events, and grant funding workshops related to use of alternative fuels.

The City of Pismo Beach has been pursuing energy efficiencies through such measures as:

- Construction of new and improvement of existing bike lanes and sidewalks through the Safe Routes to School Program to encourage walking and biking to schools (ongoing);

- The construction of bicycle lanes, sidewalks, and multi-use trails throughout the City;
- Adoption of Native Tree Ordinance (1998);
- Native tree reforestation projects at various sites throughout the City;
- Partnership with SLO Green Build to promote energy efficiency in new development;
- Joined PG&E's Climate Smart Program to purchase carbon credits to offset emissions from City Hall;
- Replacement of high pressure sodium light bulbs with energy efficient light emitting diodes (LED) bulbs in street and traffic lights;
- Development of a solar financing district through AB 811 to encourage the installation of solar panels and reduce dependence on traditional energy sources (ongoing);
- Development of a Water Conservation Landscape Ordinance (2005);
- Replace existing lighting fixtures with more efficient ballasts in city buildings; and
- Upgrade vehicle fleet with hybrid vehicles.

1.5 GHG EMISSIONS INVENTORY UPDATE

In 2010, PMC prepared an inventory of Pismo Beach's 2005 community-wide and City government emissions. Changes to GHG accounting protocols have prompted an update to the emissions inventory and in 2012 Rincon Consultants conducted a peer-review and update to the Inventory. This Inventory is the updated assessment of GHG emissions in Pismo Beach.

Rincon updated the Inventory methodology, emissions coefficients, and data for consistency with current protocols, including the Local Government Operations Protocol (LGOP) version 1.1 (May 2010), for the city government inventory, and the Association of Environmental Professionals (AEP) California Community-wide GHG Baseline Inventory Protocol (AEP Protocol) (June 2011) and ICLEI International Local Government GHG Emissions Analysis Protocol (IEAP) (October 2009), for the community-wide inventory. Rincon also updated the Inventory to include all emissions sectors within the discretionary action authority of the City. The primary additions and revisions to the updated Inventory include the following:

- Calculation of emissions from additional off-road vehicle and equipment categories (lawn and garden equipment, construction equipment, industrial equipment, and light commercial equipment) for the community-wide inventory.
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- Incorporation of a refined methodology for on-road transportation emissions. The 2012 methodology estimates vehicle miles traveled (VMT) based on an origin-destination approach using the regional travel demand model and excludes vehicle trips that pass through the city. Transportation-related GHG emissions were then calculated using the California Air Resources Board Emissions Factor 2011 (EMFAC2011) software.
- Corrections to baseline electricity and natural gas consumption data, and waste stream profile data.
- Inclusion of updated population and employment projections using the San Luis Obispo Council of Governments' (SLOCOG) 2040 Population, Housing & Employment Forecast (August 2011).

As a result of the Inventory update, Pismo Beach's community-wide 2005 baseline emissions increased by 22,400 metric tons CO_2e and 2020 forecast increased by 38,415 metric tons CO_2e compared to the July 2010 inventory.

2. Community and Government Operations Inventory Methodology

The first step toward reducing greenhouse gas emissions is to identify baseline levels and sources of emissions in the city. This information can later inform the selection of a reduction target and possible reduction measures to be included in a climate action plan.

This section outlines the methodology used to calculate the community and City government operations[9] inventories, including the difference between the two inventories, and the data collection process, data sources, GHG emission scopes, data limitations, and means of calculation.

2.1 BASELINE AND FORECAST YEARS

The year 2005 was selected as the baseline year for the Inventory due to the availability of reliable data and consistency with other cities in San Luis Obispo County. The State of California uses 1990 as a reference year to remain consistent with the Kyoto Protocol, and also because it has well-kept records of transportation trends and energy consumption in that year. However, cities and counties throughout California typically elect to use 2005 or 2006 as a baseline year because of the more reliable recordkeeping from those years and because of the large amount of growth that has occurred since 1990.

This Inventory uses a forecast year of 2020 to be consistent with the State of California GHG Inventory[10] forecast year and AB 32 target, both of which reference 2020. In addition, it is likely that any forecast considerably beyond 2020 would have a significant margin of error because of unknown population growth rates and new technology.

2.2 THE TWO INVENTORIES: COMMUNITY-WIDE AND CITY GOVERNMENT OPERATIONS

This Inventory is separated into two sections, community-wide and City government operations.

[9] In this report, the term “city” refers to the incorporated area (the jurisdictional boundary of the City of Pismo Beach), whereas “City” refers to those activities that are under the operational control of City agencies. “Community-wide” or “community” refers to all activities within the city (as defined above), including those from businesses, industrial processes, residents, vehicles, and City government operations.

[10] California Greenhouse Gas Inventory, http://www.arb.ca.gov/cc/inventory/inventory.htm

The City government operations inventory can generally be considered a subset of the community inventory, meaning that the majority of City government operations are included in the commercial/industrial, transportation, waste, or "other" categories of the community-wide inventory. The City's government operations inventory should not be added to the community analysis; rather it should be looked at as a slice of the complete picture as illustrated in **Figure 2-1**. It should be noted however, that portions of employee commute that occur outside the jurisdiction and waste water treatment process emissions are not also included within the community inventory. Although City operations are a small contributor to the community's overall emissions levels, an inventory allows the City to track its individual facilities and vehicles and to evaluate the effectiveness of its emissions reduction efforts at a more detailed level.

FIGURE 2-1: THE RELATIONSHIP BETWEEN COMMUNITY-WIDE AND CITY GOVERNMENT INVENTORIES

Once completed, these inventories provide the basis for policy development, the quantification of emissions reductions associated with proposed measures, the creation of an emissions forecast, and the establishment of an informed emissions reduction target.

2.3 DATA COLLECTION AND METHODOLOGY

Creating the community and City government operations emissions inventories required the collection of information from a variety of sources. Sources for community data included the

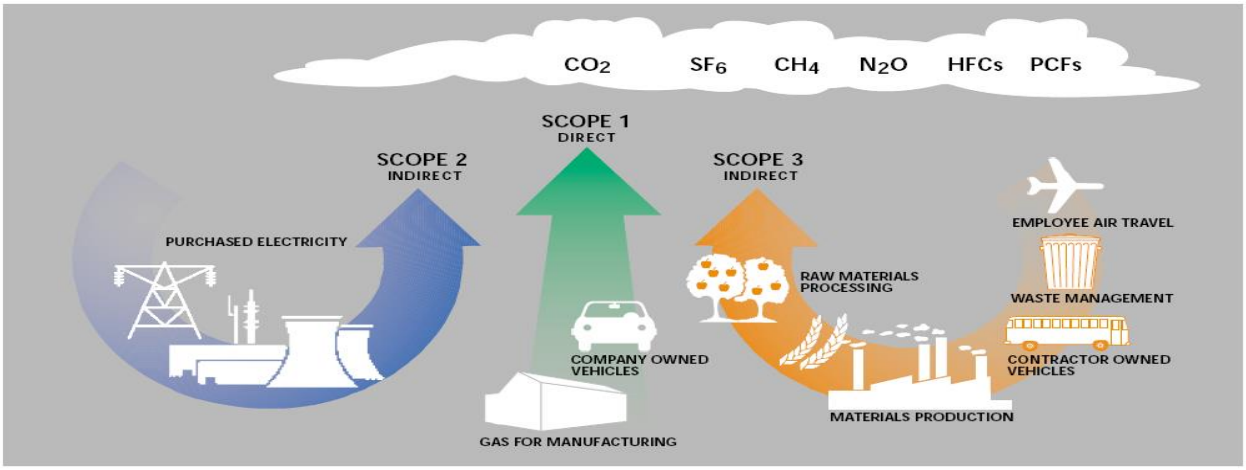
Pacific Gas and Electric Company (PG&E), the Southern California Gas Company, Caltrans, the California Air Resources Board, Cal-Recycle, and the County of San Luis Obispo. City government operations data sources included PG&E, the Southern California Gas Company, South County Sanitary, and documentation from multiple City departments including Planning, Public Works, Finance, Police, Fire, and more. Data from the year 2005 were used in both inventories, with the following exceptions:

- A subset of waste data by type was not available for 2005, therefore this study utilizes a California statewide waste characterization study conducted in 2003-2004;
- City employee commuting trips were calculated using an employee survey conducted in 2010; and
- Propane, wind and solar power used within the City's geographic boundary.

For community activities and City operations, emissions sources are categorized by scope. Scopes help us identify where emissions originate from and what entity retains regulatory control and the ability to implement efficiency measures. The scopes are illustrated in **Figure 2-2** and defined as follows:

- **Scope 1.** Direct emissions sources located within the community, mostly from the combustion of fuels. Examples of Scope 1 sources include use of fuels such as gasoline and natural gas.
- **Scope 2.** Indirect emissions that result because of activities within the community, limited to electricity, district heating, steam and cooling consumption. An example of a Scope 2 source is purchased electricity used within the community. These emissions should be included in the community-wide analysis, as they are the result of the community's electricity consumption.
- **Scope 3.** All other indirect emissions that occur as a result of activity within the community. Examples of Scope 3 emissions include methane emissions from solid waste generated within the community which decomposes at landfills either inside or outside of the community.

FIGURE 2-2: GHG EMISSIONS SCOPES



Source: NZBCSD (2002), The Challenge of GHG Emissions: the "why" and "how" of accounting and reporting for GHG emissions: An Industry Guide, New Zealand Business Council for Sustainable Development, Auckland

Appendices A and **B** of this report separate the community and City government operations emissions by scope. Each sector is labeled with a 1, 2, or 3 that corresponds to the scopes above.

2.4 DATA SOURCES

The data used to complete this Inventory came from multiple sources, as summarized in **Tables 2-1** and **2-2**. Utility providers supplied electricity and natural gas consumption data associated with commercial, industrial, residential, and City government buildings in 2005. Vehicle miles traveled (VMT) information was provided by Fehr and Peers and calculated using SLOCOG's Regional Travel Demand model. These data sources are further explained in the sector-specific discussions of this document.

TABLE 2-1: DATA SOURCES FOR COMMUNITY ANALYSIS, 2005

Sector	Information	Unit of Measurement	Data Source
Residential	Electricity consumption	kWh	PG&E
	Natural gas consumption	Therms	Southern California Gas Company
Commercial/Industrial	Electricity consumption	kWh	PG&E
	Natural gas consumption	Therms	Southern California Gas Company
Transportation	VMT excluding pass through trips	Average Weekday Daily VMT	Fehr & Peers
Solid Waste	Solid waste tonnage sent to landfill from activities in City of Pismo Beach	Short tons	San Luis Obispo Integrated Waste Management Board
Wastewater Treatment Facilities	Methane and nitrous oxide released in the wastewater treatment process	Tonnes	Public Works Department Data Records
Off-Road Vehicles and Equipment	Emissions from off-road equipment	Tons/year of N_2O, CO_2, and CH_4	California Air Resources Board OFFROAD2007 model

TABLE 2-2: DATA SOURCES FOR CITY GOVERNMENT OPERATIONS ANALYSIS, 2005

Sector	Information	Unit of Measurement	Data Source
Buildings & Facilities	Electricity consumption	kWh	PG&E Data Records
	Natural gas consumption	Therms	Southern California Gas Company Data Records
Vehicle Fleet	Diesel consumption and corresponding vehicle type	Gallons	Billing Records
Employee Commute	Sample of employee commuting patterns	Annual VMT	Commuter Survey (December 2009)
Streetlights	Electricity consumption	kWh	PG&E Data Records
Water/Sewage	Electricity consumption	kWh	PG&E Data Records
	Methane and nitrous oxide released in the wastewater treatment process	Tonnes	Public Works Department Data Records
Waste	Annual waste tonnage sent to landfill	Tons	Billing Records

2.5 DATA LIMITATIONS

It is important to note that calculating community-wide greenhouse gas emissions with precision is a complicated task. The ICLEI Clean Air and Climate Protection (CACP2009) software relies on numerous assumptions and is limited by the quantity and quality of available data. Because of these limitations it is useful to think of any specific number generated by the model as an approximation of reality, rather than an exact value. The city's actual 2005 greenhouse gas emissions are likely to be *slightly* greater than what are reported in this document due to three main factors: (1) data limitations, (2) privacy laws, and (3) a lack of a reasonable methodology to collect or model emissions data. The following paragraphs highlight emissions that cannot be included in a GHG Inventory under current science and policy direction, or due to lack of reliable data.

Data Limitations

Lack of available data prevented the calculation of emissions from community-wide freight and passenger trains, propane use, and City government operations refrigerants. For rail and port, as well as equipment emissions, the California Air Resources Board OFFROAD 2007 software provides emissions data; however, these numbers are aggregated for the entire San Luis Obispo County area, including incorporated, unincorporated, and state or federally owned land.

Lack of data availability also prevents the calculation of emissions from propane (liquefied petroleum gas, or LPG) created within the city's boundaries. Propane is basically an unregulated fuel in California (except for storage and safety issues which are regulated). Because it is an unregulated commodity, no data is collected by the state on propane sales or usage.

Another sector that was excluded from the inventory is City government operations refrigerants. The City of Pismo Beach made a best effort to gather data on the amount of refrigerants consumed by fleet vehicles, HVAC systems, and City government operations facilities; however City records were not suited to this purpose. It is recommended that the City look into amending its record keeping so that the amount of refrigerants purchased and consumed within a year is recorded.

Privacy Laws

This Inventory does not separately analyze site-level emissions from specific sources such as refineries or large industrial emitters. The emissions from industrial energy consumption and related transportation are included under the commercial/industrial category, but will not be analyzed independently as part of this Inventory for two reasons:

1) State privacy laws prevent us from obtaining site-level energy consumption data from utility providers. Notably the California Public Utilities Commission 15/15 rule,[11] prevents us from analyzing industrial emissions separately from commercial emissions.

2) It is the responsibility certain stationary sources or emitter to perform site-specific s energy audits and reduction processes. Efforts to require site-level energy audits and greenhouse gas emissions reporting are being continually expanded and required by the

[11] Commercial and Industrial Electricity and Natural Gas were combined into one section due to the California 15/15 rule. The 15/15 rule was adopted by the California Public Utilities Commission in the Direct Access Proceeding (CPUC Decision 97-10-031) to protect customer confidentiality.

California Climate Action Registry, U.S. Environmental Protection Agency, and California Air Resources Board.

Lack of a Reasonable Methodology

There is a lack of reasonable methodology for estimating life cycle emissions for the community and, therefore, emissions associated with the production and disposal of items consumed by a community are not included in the Inventory. For instance, a life cycle assessment would estimate the emissions associated with the planning, production, delivery, and disposal of each car currently in the city. In contrast, this analysis only captures how much that car drives within the city.

Despite these limitations, the Clean Air and Climate Protection (CACP) software 2009[12] and ICLEI methodology provide the best-available snapshot of the city's greenhouse gas emissions. Additionally, the CACP2009 tool is utilized to promote consistency among municipalities throughout the country and the world. Sector-specific data limitations or methodological issues are explained thoroughly in **Appendices C** and **D.**

However, it is important to note that the emissions identified in this report are primarily greenhouse gases that the community has directly caused and has the ability to reduce through implementation of conservation actions, a Climate Action Plan, or corresponding efforts.

2.6 CLEAN AIR AND CLIMATE PROTECTION SOFTWARE 2009

The City government operations and community-wide inventories use the Clean Air and Climate Protection (CACP2009) software package developed by ICLEI in partnership with the National Association of Clean Air Agencies (NACAA) and Torrie Smith Associates. This software calculates emissions resulting from energy consumption, vehicle miles traveled, and waste generation. The CACP2009 software calculates emissions using specific factors (or coefficients) according to the type of fuel used.

CACP2009 aggregates and reports the three main greenhouse gas emissions (CO_2, CH_4, and N_2O) and converts them to equivalent carbon dioxide units, or CO_2e. Equalizing the three main greenhouse gas emissions as CO_2e allows for the consideration of different greenhouse gases in comparable terms. For example, methane (CH_4) is 21 times more powerful than carbon

[12] The Clean Air and Climate Protection (CACP2009) software 2009 was developed by the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (SAPPA/ALAPCO), the International Council for Local Environmental Issues (ICLEI), and Torrie Smith Associates.

dioxide on a per weight basis in its capacity to trap heat, so the CACP2009 software converts one metric ton of methane emissions to 21 metric tons of carbon dioxide equivalents.[13]

The emissions coefficients and quantification method employed by the CACP2009 software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National Inventories) and the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form1605).

[13] The potency of a given gas in heating the atmosphere is defined as its Global Warming Potential, or GWP. For more information on GWP see: IPCC Fourth Assessment Report, Working Group I, Chapter 2, Section 2.10.

3. Community GHG Inventory Results

The City of Pismo Beach contains primarily residential and commercial land uses. In the 2005 baseline year, there were approximately 8,620 people and 3,160 jobs in the city.[14] The following section provides an overview of the emissions caused by activities within the jurisdictional boundary of the city and analyzes the emissions in terms of scope, sector, source, and population.

3.1 COMMUNITY-WIDE EMISSIONS BY SCOPE

Although there are countless items that can be included in a community-wide emissions inventory, as discussed in Chapter 2, this Inventory includes Scope 1, Scope 2, and Scope 3 sources from the following sectors, consistent with the ICLEI protocol:

- Residential
- Commercial / Industrial
- Transportation
- Waste
- Wastewater
- Off-Road Vehicles and Equipment Emissions.

What are Scopes?

The key principles to remember are that Scope 1 emissions are caused by activities within the city and emitted within the city (fuel combustion), while Scope 2 emissions are caused by activities within the city, but most likely are emitted outside of the city (electricity). Scope 3 emissions are indirect emissions, such as waste decomposition.

Table 3-1 summarizes the scopes of each sector in this analysis.

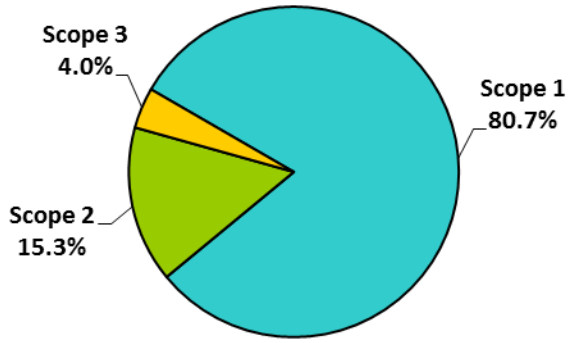
[14] Baseline population, household, and job data for the year 2005 was obtained from SLOCOG's Long Range Socio-Economic Projections (Year 2030), prepared by Economics Research Associates (July 2006 Revision).

TABLE 3-1: GHG EMISSIONS SOURCES INCLUDED IN 2005 COMMUNITY INVENTORY BY SCOPE AND SECTOR

Sector	Scope 1	Scope 2	Scope 3
Residential	Natural Gas	Electricity	---
Commercial/Industrial	Natural Gas	Electricity	---
Transportation	Gasoline & Diesel	---	---
Waste	---	---	Methane from Decomposition
Wastewater	Methane and Nitrous Oxide released in the wastewater treatment processes		
Off-Road	Gasoline, Diesel & Compressed Natural Gas	---	---

Including all sectors and scopes, the community emitted approximately 87,077 metric tons of CO_2e in 2005. As shown in **Figure 3-1** and **Table 3-2,** the majority of community GHG emissions were Scope 1 (80.7%), with Scope 2 (15.3%) and Scope 3 (4.0%) constituting the remainder.

FIGURE 3-1: COMMUNITY GHG EMISSIONS BY SCOPE, 2005



The largest portion of Scope 1 emissions came from the transportation sector (refer to **Table 3-2** and **Figure 3-1**). These emissions qualify as Scope 1 because they involve the direct combustion of fuel within the jurisdictional boundary of the city. The second largest source of Scope 1 emissions was residential natural gas use. Commercial/Industrial uses generated the largest percentage of Scope 2 emissions. Emissions from waste operations account for the whole of Scope 3 emissions.

TABLE 3-2: COMMUNITY GHG EMISSIONS PER SECTOR PER SCOPE, 2005

Sector	Scope 1	Scope 2	Scope 3	Total
Residential	9,459	5,349		14,808
Commercial/Industrial	6,972	7,986		14,958
Transportation	51,811			51,811
Off-Road	1,821			1,821
Waste			3,479	3,479
Wastewater	200			200
TOTAL	70,263	13,335	3,479	87,077
Percentage of Total CO_2e	80.7%	15.3%	4.0%	100.0%

3.2 ALL SCOPE EMISSIONS BY SECTOR

As noted above, the community emitted approximately 87,077 metric tons of CO_2e in calendar year 2005. In addition to analyzing the data by scope, it can also be aggregated by sector. As depicted in **Figure 3-2** and **Table 3-3** below, the transportation sector was the largest emitter (59.5%) in 2005. Emissions from the commercial and industrial sectors combined were the next largest contributor (17.2%), while the residential sector accounted for 17.0% of the total. Emissions from solid waste comprised 4.0% of the total, and emissions from other sources such as off-road vehicles and equipment and methane emissions from wastewater treatment processes comprised the remaining 2.3% of the total.

FIGURE 3-2: COMMUNITY GHG EMISSIONS BY SECTOR, 2005

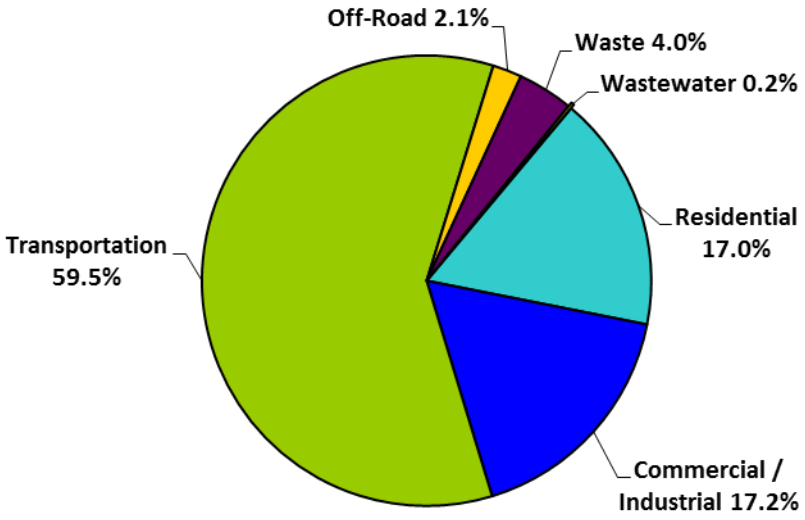


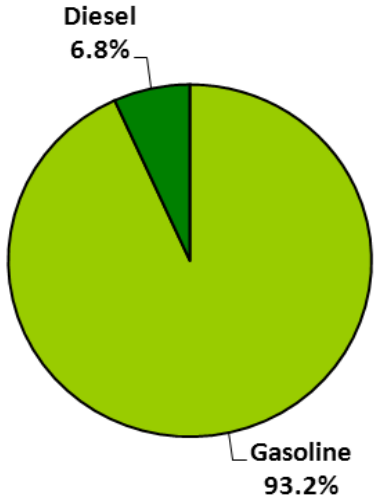
TABLE 3-3: COMMUNITY GHG EMISSIONS BY SECTOR, 2005

2005 Community Emissions by Sector	Residential	Commercial/ Industrial	Transportation	Off-Road	Waste	Wastewater	TOTAL
CO_2e (metric tons)	14,808	14,958	51,811	1,821	3,479	200	87,077
Percentage of Total CO_2e	17.0%	17.2%	59.5%	2.1%	4.0%	0.2%	100%

3.3 TRANSPORTATION

Transportation sector emissions are the result of diesel and gasoline fuel used in vehicles traveling on local roads and state highways within the jurisdictional boundaries of Pismo Beach. Consistent with the majority of California communities, travel by on-road motorized vehicles constitutes the greatest percentage of GHG emissions in the city (59.5%). Of the total transportation sector emissions, an estimated 93.2% was due to gasoline consumption, with the remaining 6.8% was due to diesel fuel use (refer to **Figure 3-3** and **Table 3-3**).

FIGURE 3-3: COMMUNITY GHG EMISSIONS BY ROAD TYPE



Using origin-destination analysis and the SLOCOG Regional Travel Demand Model, three types of vehicle trips were tracked in the city:

1. Internal-Internal: Vehicle trips that remained inside the city
2. Internal-External and External-Internal: Vehicle trips that have an ending or a beginning in the city
3. External-External: Vehicle trips that pass through the city without originating or ending in the city

Fehr & Peers calculated VMT for each of the three types of vehicle trips using the recommendation of the Regional Target Advisory Committee (RTAC), the body responsible for Senate Bill 375 target setting. VMT from trips of type 1, 2, and 3 (see above) were counted 100%, 50%, and 0% respectively toward jurisdiction-generated VMT.[15] The VMT results are summarized in Appendix C**.** Annual VMT was then analyzed to determine GHG emissions from vehicle travel using the EMFAC2011 software developed by the California Air Resources Board.

[15] Since external-external VMT is the result of vehicle trips that pass through the city without originating or ending in the city, they are excluded from the inventory as the City is unable to directly impact these VMT. However, they are identified in Appendix C for informational purposes only.

EMFAC2011 uses emissions rates for different types of vehicles in conjunction with travel activity statistics to calculate vehicle based emissions in metric tons per day. For a detailed description of the methodology used to estimate transportation-related emissions, please see Appendix C.

3.4 THE BUILT ENVIRONMENT (RESIDENTIAL, COMMERCIAL, INDUSTRIAL)

With all scopes aggregated, 34.2% of total community-wide emissions in the year 2005 came from the "built environment." The built environment is comprised of the residential, commercial, and industrial natural gas and electricity consumption. This analysis does not include emissions from other types of energy such as propane, solar, and wind due to lack of reliable sales, construction, or consumption data. The commercial and industrial sectors are combined in this Inventory due to the mandatory aggregating of commercial and industrial data by PG&E previously referenced.

In 2005, emissions from the built environment were split almost evenly (49.7-50.3%) between the residential sector and the commercial/industrial sector (see **Figure 3-4**). All of the emissions calculated from the built environment were the result of local natural gas consumption (Scope 1) and local consumption of electricity generated outside of the city (Scope 2). Overall, electricity consumption and natural gas consumption were split 44.8-55.2% as the cause of emissions

FIGURE 3-4: BUILT ENVIRONMENT GHG EMISSIONS BY SECTOR

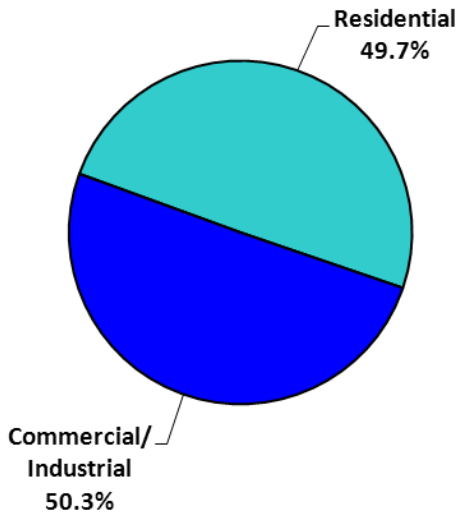
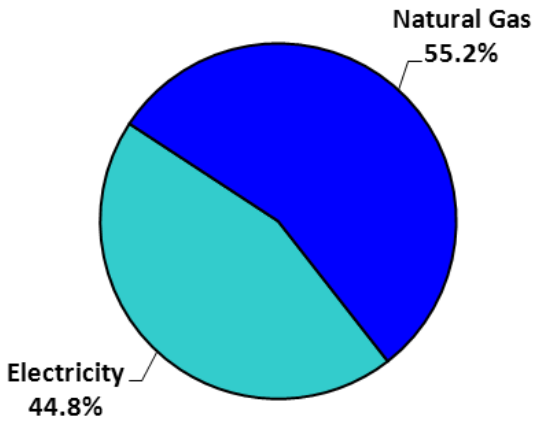


FIGURE 3-5: BUILT ENVIRONMENT GHG EMISSIONS BY SOURCE



from the built environment in 2005 as shown in **Figure 3-5**.

Approximately 63.9% of emissions in the residential sector resulted from combustion of natural gas for heating and cooking (see **Figure 3-6** and **Table 3-4**), while 46.6% of emissions in the commercial/industrial sector came from natural gas (see **Figure 3-7** and **Table 3-5**).

FIGURE 3-6: RESIDENTIAL GHG EMISSIONS BY SOURCE

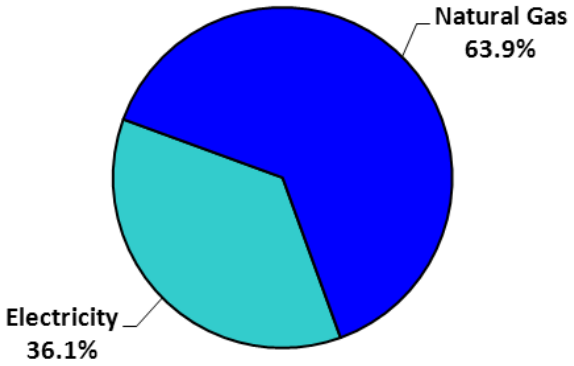


FIGURE 3-7: COMMERCIAL/ INDUSTRIAL GHG EMISSIONS BY SOURCE

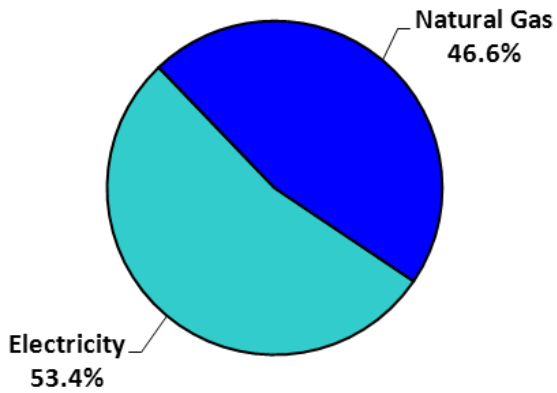


TABLE 3-4: RESIDENTIAL GHG EMISSIONS BY SOURCE

Residential Emissions Sources 2005	Electricity	Natural Gas	TOTAL
CO_2e (metric tons)	5,349	9,459	14,808
Percentage of Total CO_2e	36.1%	63.9%	100%
Energy Use (MMBtu)	81,631	177,809	259,440

TABLE 3-5: COMMERCIAL/INDUSTRIAL GHG EMISSIONS BY SOURCE

Commercial/Industrial Emissions Sources 2005	Electricity	Natural Gas	TOTAL
CO_2e (metric tons)	7,986	6,972	14,958
Percentage of Total CO_2e	53.4%	46.6%	100%
Energy Use (MMBtu)	121,875	131,061	252,936

3.5 WASTE

Solid waste disposed of at managed landfills was responsible for 4.0% of total emissions for the community. The CACP2009 software calculates methane generation from waste sent to landfill in 2005, and accounts for the reported methane recovery factors among the two utilized landfills (Cold Canyon and Chicago Grade), which have a 60% weighted average. The Cold Canyon Landfill accepted approximately 99% of the community's solid waste, while 1% went to Chicago Grade. The methane recovery factors of the landfills are well documented by the San Luis Obispo Air Pollution Control District based on the system operations at that time. For more information, please see detailed methodology in **Appendix C**.

Waste emissions are considered Scope 3 emissions because they are not generated in the base year, but will result from the decomposition of waste generated in 2005 over the full 100-year+ cycle of its decomposition. In 2005, the community sent approximately 11,921 tons of waste to landfill. The 2004 California Statewide Waste Characterization Study provides standard waste composition for the State of California.[16] Identifying the different types of waste in the general mix is necessary because decomposition of some materials generate methane within the anaerobic environment of landfills whereas others do not. Carbonaceous materials such as paper and wood actually sequester[17] the methane released in managed landfills, therefore offsetting some or all of the emissions from food and plant waste. **Figure 3-8** and **Table 3-6** show the estimated percentage of emissions coming from the various types of organic, methanogenic waste.

[16] http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

[17] Sequestration involves the storage of carbon dioxide in a solid material through biological or physical processes.

FIGURE 3-8: WASTE GHG EMISSIONS BY TYPE

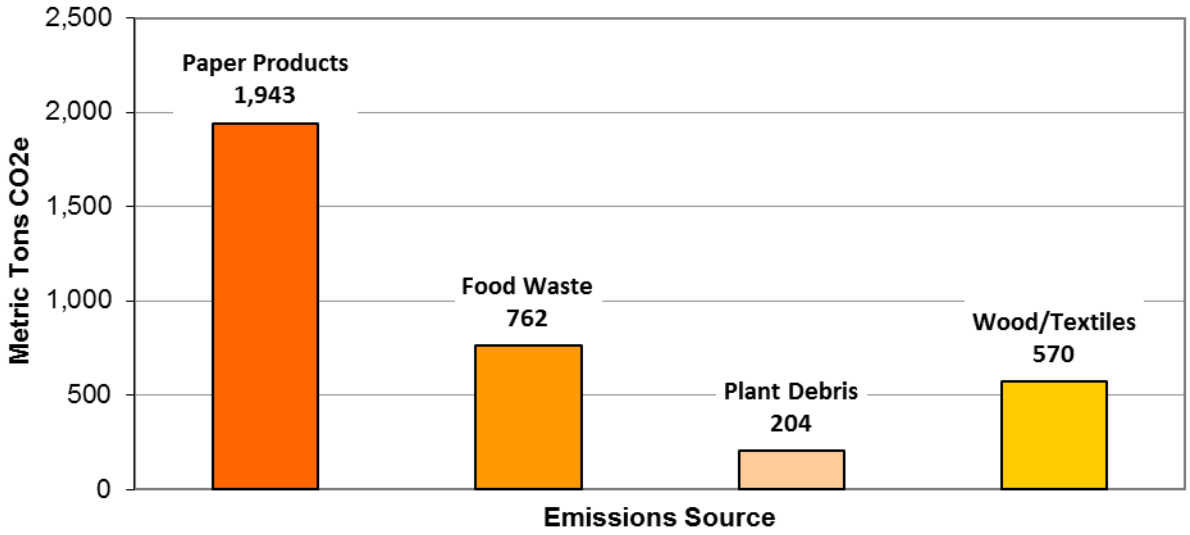


TABLE 3-6: WASTE GHG EMISSIONS BY WASTE TYPE

Waste Emissions Sources 2005	Paper Products	Food Waste	Plant Debris	Wood / Textiles	All Other Waste	TOTAL
CO_2e (metric tons)	1,943	762	204	570	0	3,479
Percentage of Total CO_2e	55.8%	21.9%	5.9%	16.4%	0.0%	100%

3.6 WASTEWATER

The wastewater treatment plant consists of several aerated lagoons and provides a cost effective way to treat water. As organic matter is broken down through the process of lagoons, methane and nitrous oxide is released into the atmosphere. Methane and nitrous oxide emissions released during wastewater treatment processes were responsible for 0.2% of total emissions for the community. Natural gas and electricity emissions associated with wastewater treatment facilities operations are accounted for within the commercial/industrial sector.

3.7 OFF-ROAD VEHICLES AND EQUIPMENT

Gasoline, diesel, and compressed natural gas fuel are used to power off-road equipment in the City of Pismo Beach. Off-road equipment incorporated in this inventory includes agriculture, lawn and garden, construction and mining, light commercial equipment, and industrial equipment. Off-road vehicles and equipment accounted for 2.1% of the City's emissions in 2005. The California Air Resources Board's OFFROAD 2007 software provides emissions data for off-road equipment by county. The countywide data was attributed to city based on the indicators presented in **Table 3-7.**

TABLE 3-7: COUNTY-WIDE EQUIPMENT TYPE INDICATORS

Equipment Type	Allocation Indicator
Agricultural Equipment	Acres of cropland
Construction and Mining Equipment	Construction and mining jobs
Industrial Equipment	Industrial jobs
Lawn and Garden Equipment	Households
Light Commercial Equipment	Service and commercial jobs

Approximately 52.8% of off-road equipment emissions in 2005 came from construction and mining equipment, while 22.3% were the result of light and commercial equipment. The remaining off-road equipment activities included in this Inventory include lawn and garden equipment, industrial equipment, and agricultural equipment, making up the remaining 24.9% of emissions collectively (see **Table 3-8** and **Figure 3-9**). Total emissions from off-road equipment for 2005 is estimated to be approximately 1,821 MT CO2e. Of the total emissions in the off-road sector, an estimated 84.0% was due to diesel consumption, with the remaining 16.0% coming from gasoline and compressed natural gas use (see **Table 3-9** and **Figure 3-10**).

FIGURE 3-9: OFF-ROAD GHG EMISSIONS BY EQUIPMENT TYPE

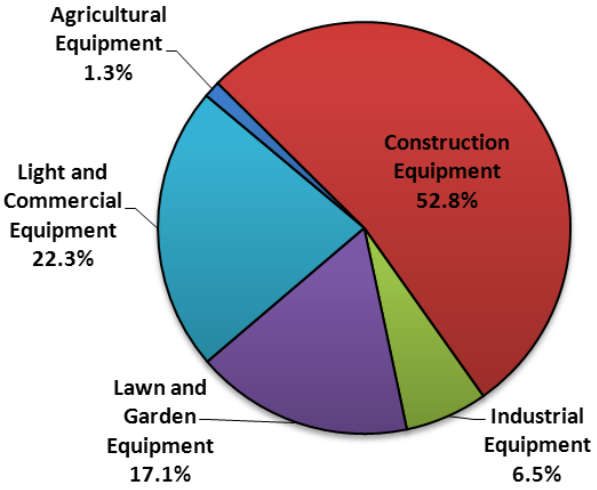


FIGURE 3-10: OFF-ROAD GHG EMISSIONS BY FUEL TYPE

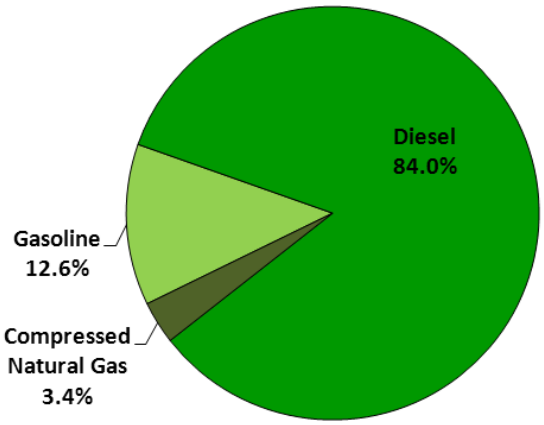


TABLE 3-8: OFF-ROAD GHG EMISSIONS BY EQUIPMENT TYPE

Equipment Type Emissions Sources 2005	Agricultural Equipment	Construction Equipment	Industrial Equipment	Lawn and Garden Equipment	Light and Commercial Equipment	TOTAL
CO_2e (metric tons)	24	961	118	311	407	1,821
Percentage of Total CO_2e	1.3%	52.8%	6.5%	17.1%	22.3%	100%

TABLE 3-9: OFF-ROAD GHG EMISSIONS BY FUEL TYPE

Off-Road Fuel Emissions Sources 2005	Gasoline	Diesel	Compressed Natural Gas	TOTAL
CO_2e (metric tons)	230	1,530	61	1,821
Percentage of Total CO_2e	12.6%	84.0%	3.4%	100%

3.8 COMMUNITY EMISSIONS BY SOURCE

In addition to viewing emissions by sector and by scope, policy and programs development can benefit from an analysis of emissions according to their raw fuel or waste source. **Figure 3-11** and **Table 3-10** below demonstrates that more than half (55.7%) of all community emissions come from the consumption of gasoline on local roads and highways. Natural gas (19.0%) and electricity (15.3%) consumption from the built environment are the next most significant figures, with the remainder coming from diesel, off-road equipment and various waste products.

FIGURE 3-11: COMMUNITY GHG EMISSIONS BY SOURCE, 2005

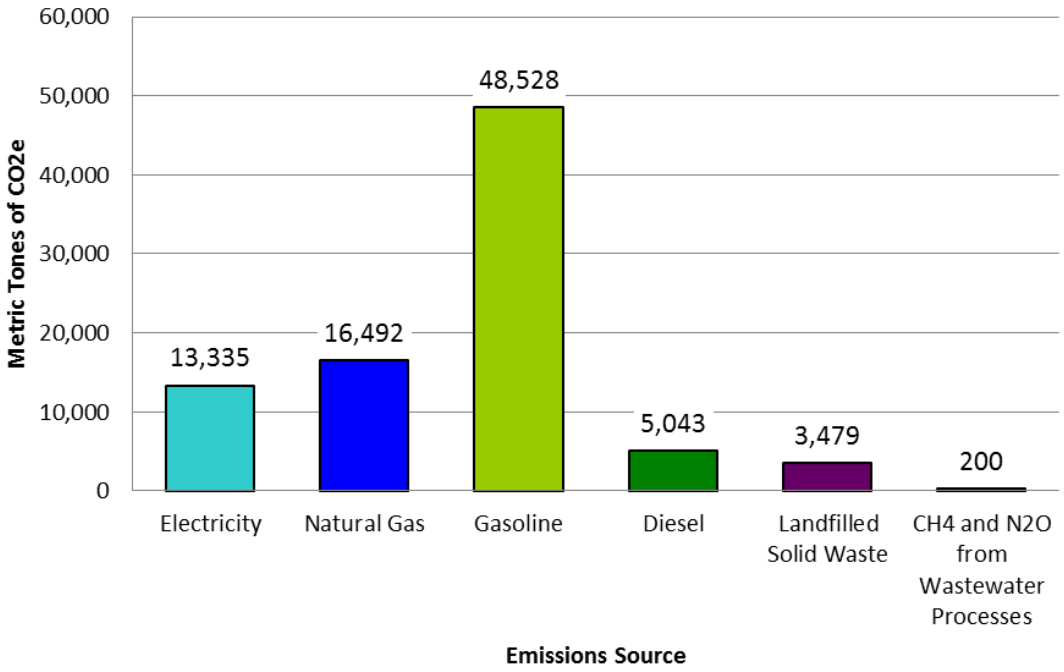


TABLE 3-10: COMMUNITY GHG EMISSIONS BY SOURCE, 2005

Community GHG Emissions 2005 by Source	CO_2e (metric tons)	CO_2e (percent of total)
Electricity	13,335	15.3%
Natural Gas	16,492	19.0%
Gasoline	48,528	55.7%
Diesel	5,043	5.8%
Landfilled Solid Waste	3,479	4.0%
CH_4 and N_2O from Wastewater Treatment Processes	200	0.2%
TOTAL	87,077	100%

3.9 PER CAPITA EMISSIONS

Per capita emissions can be a useful metric for measuring progress in reducing greenhouse gases and for comparing one community's emissions with neighboring cities and against regional and national averages. Currently it is difficult to make meaningful comparisons between local inventories because of variations in the scope of inventories conducted. For instance, this Inventory takes in to account emissions from off-road vehicles, which many inventories like the Sonoma County GHG Inventory do not. Only when ICLEI, the California Air Resources Board, and other organizations adopt universal reporting standards will local inventories be prepared in a consistent manner and therefore be comparable.

Simply dividing total community greenhouse gas emissions by city population in 2005 (8,644) yields a result of 10.07 metric tons CO_2e per capita.[18] It is important to understand that this number is not the same as the carbon footprint of the average individual living in the City of Pismo Beach, which accounts for a wider scope. It is also important to note that the per capita emissions number for the city is not directly comparable to every per capita number produced by other emissions studies because of differences in emission inventory methods.

[18] Baseline population data for the year 2005 was obtained from SLOCOG's Long Range Socio-Economic Projections (Year 2030), prepared by Economics Research Associates (July 2006 Revision).

4. City Government Operations GHG Emissions Inventory Results

The City of Pismo Beach government is comprised of six departments: Administration, Administrative Services, Community Development, Public Works/Engineering, Police and Fire Departments. This Inventory accounts for the 88 people employed by the City and City-owned and/or –operated buildings and facilities in 2005.

This chapter reviews the results of the City government operations inventory by sector, including emissions resulting from employee commutes.

4.1 CITY GOVERNMENT OPERATIONS INVENTORY RESULTS

City government operations and facilities produced approximately 1,897 metric tons of greenhouse gas emissions in 2005. As displayed in **Figure 4-1**, this is approximately 2.2% of total community-wide emissions. City government emissions result from waste, energy consumption from wastewater facilities, buildings, streetlights and other facilities, fuel consumption by the vehicle fleet and employee commutes, wastewater treatment processes, and miscellaneous equipment. The wastewater facilities and processes were the largest contributor to the City's emissions (28.5%) producing 540 metric tons of carbon dioxide equivalent. Employee commute then the vehicle fleet were the second and third largest contributors to the City's emissions (15.9% and 15.8% respectively), producing 301 and 300 metric tons of carbon dioxide equivalent (refer to **Figure 4-2** and **Table 4-1** below).

FIGURE 4-1: CITY GOVERNMENT CONTRIBUTION TO COMMUNITY-WIDE GHG EMISSIONS

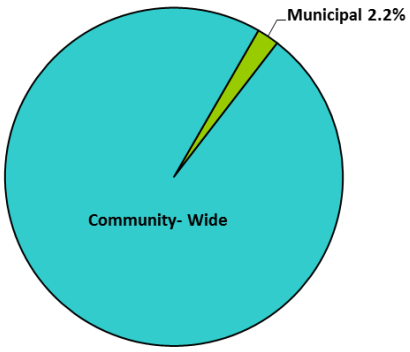
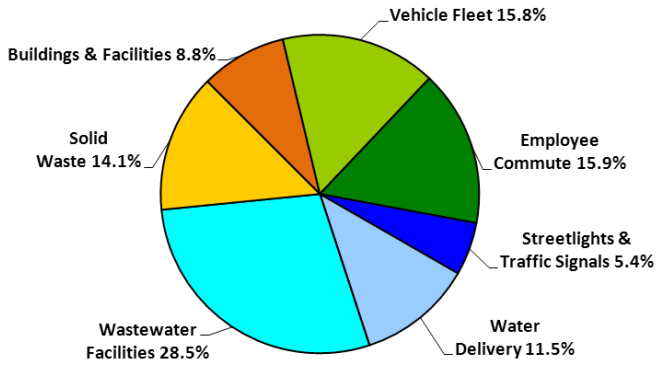


FIGURE 4-2: CITY GOVERNMENT GHG EMISSIONS BY SECTOR, 2005



As mentioned in the Introduction, these emissions are a subset of the community emissions inventory discussed in **Chapter 3**. The City's government operations emissions are separately analyzed in this section in a manner that is similar to how an industry or business would produce a facility-scale greenhouse gas audit. The Local Government Greenhouse Gas Inventory Protocol developed by the California Air Resources Board, The Climate Registry, the California Climate Action Registry, and ICLEI guides the methodology for estimating emissions from local government operations. Local government emissions reporting is deemed significant in order to establish local governments as climate leaders in the community so that they can lead by example and pave the way for energy efficiency improvements.

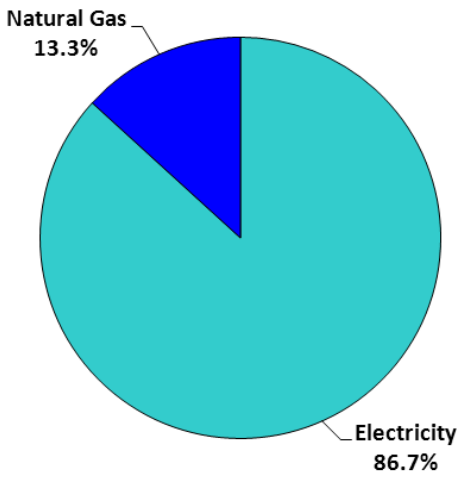
TABLE 4-1: CITY GOVERNMENT GHG EMISSIONS BY SECTOR, 2005

2005 Emissions by Sector	Buildings & Facilities	Vehicle Fleet	Employee Commute	Street Lights & Traffic Signals	Water Delivery	Waste-water Facilities	Solid Waste	TOTAL
CO_2e (metric tons)	166	300	301	102	221	540	267	1,897
Percentage of CO_2e	8.8%	15.8%	15.9%	5.4%	11.5%	28.5%	14.1%	100.0%

4.2 BUILDING SECTOR

The building sector includes greenhouse gas emissions from energy consumption in facilities owned and operated by a municipality. This inventory calculates electricity and natural gas consumption in City-owned and -operated facilities. The facilities included in this analysis include City Hall, fire and police stations, recreation facilities, Chamber of Commerce, parks, and numerous other facilities. As depicted in **Figure 4-3** and **Table 4-2**, the majority of emissions resulted from electricity consumption (86.7%).

FIGURE 4-3: BUILDING GHG EMISSIONS BY SOURCE



These emissions and associated consumption data will be useful in determining significant

sources of energy consumption from City facilities. This will allow for the City to designate priority facilities for energy efficiency retrofits and conservation outreach.

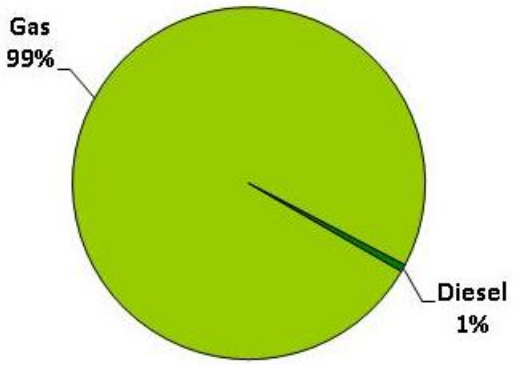
TABLE 4-2: BUILDING SECTOR GHG EMISSIONS BY SOURCE

2005 City Government Operations Emissions by Sector	Electricity	Natural Gas	Total
CO_2e (metric tons)	144	22	166
Percentage of Total CO_2e	86.7%	13.3%	100%
Energy Use (MMBtu)	2,204	410	2,614

4.3 VEHICLE FLEET

City-owned and -operated vehicles emitted approximately 298 metric tons of CO_2e, or 15.7% of total City government emissions. This sector includes gasoline and diesel consumption from all departments in the City operating vehicles, including the Fire and Police Departments, Community Services, Public Works, and Community Development. This estimate is based on 2005 fuel billing record data provided by the Finance Department. The City does not own or operate public transit vehicles.

FIGURE 4-4: VEHICLE FLEET FUEL CONSUMPTION PER YEAR BY TYPE



The majority of fuel used by the City is gasoline (over 99%), with the remainder diesel (less than 1.0%) (see **Figure 4-4**). When compared to the total emissions per fuel type, diesel emissions actually produce less CO_2e for the vehicle types used by the City. However, there are other, non-CO_2e emissions from diesel-like particulate matter that make such a comparison misleading to the reader. The trend for diesel to emit less CO_2e in this case does not necessarily mean that the City should aim to convert more vehicles to conventional diesel. There are multiple clean and alternative fuel options available, including biodiesel conversion, electric vehicles, hybrid vehicles, smaller vehicles, and shared vehicles.

4.4 EMPLOYEE COMMUTE

This sector estimates greenhouse gas emissions from City employees traveling to and from work in 2005. The estimate is based on a December 2009 online survey conducted by the City, a blank version of which is included as **Appendix F**. Approximately 52 employees responded to the survey with usable information, meaning that all essential questions were answered. This results in approximately a 58% response rate, the results of which were applied to the City employment total for 2005.

The online survey found that most City employees travel to and from work by car. Employees were asked how many days of the week they travel by each commute mode, including driving alone (which includes motorcycles), carpooling, vanpooling, public transit, bicycling, walking, telecommuting, and other. The results show that employees get to and from 90.7% of their workdays by personal vehicle. The second most popular mode of transportation was bicycling and walking with a combined 4.1% of the total. Employees were very unlikely to carpool or take public transportation to work, accounting for none of the reported workday commutes (0.0%). Approximately 5.1% of employees responded with other forms of transportation or did not commute. This is likely the result of flexible working schedules.

TABLE 4-3: DAYS OF CITY EMPLOYEE TRAVEL BY COMMUTE MODE

Mode of Travel	Days traveled by Commute mode	% of Total
Drive Alone	10,192	90.7%
Carpool	0	0.0%
Vanpool	0	0.0%
Public transit	0	0.0%
Bicycle	104	0.9%
Walk	364	3.2%
Other	572	5.1%
Total	11,232	100%

These figures for commute mode were combined with each respondent's travel distance to work, car model (if any), and fuel type (if any). The results show vehicle miles traveled (VMT) annually per vehicle type and fuel type (see **Table 4-4**). These VMT numbers were then

adjusted for the total employee population in 2005 and entered into the CACP2009 software to obtain CO_2e.

Driving patterns were assumed to be constant for the purposes of this study; therefore, the 2009 sample was applied directly to the 2005 employee population. Only two modifications to the sample data was made in order to account for the large increase in hybrid car sales and consumption of biodiesel between 2005 and 2009. The proportion of hybrid to traditional vehicles was roughly two-thirds less in 2005 than in 2009, according to State sales data.[19] According to national sales data, 30% of the biodiesel consumed in 2008 was consumed in 2005.[20]

The 2009 survey results, adjusted for 2005 employee totals, resulted in an estimate of 301 metric tons CO_2e in 2005 from commuter travel to and from work. This figure comprises 15.9% of total greenhouse gas emissions released from City government operations. The calculation does not include employee business travel or travel during lunchtime hours.

TABLE 4-4: EMPLOYEE COMMUTE VMT BY VEHICLE AND FUEL TYPE

Vehicle Group	2009 Survey results		Adjusted for 2005	
	Annual VMT	Fuel Type	Annual VMT	Fuel Type
Light Truck/SUV/Pickup	22,244.33	Gasoline	37,592.92	Gasoline
	0.00	Diesel	0.00	Diesel
Large Truck	38,926.28	Gasoline	65,785.41	Gasoline
	9,392.40	Diesel	15,873.16	Diesel
Passenger Vehicle	154,144.94	Gasoline	259,625.85	Gasoline
	0.00	Diesel	3,968.29	Diesel
	1,565.40	Biodiesel	793.66	Biodiesel
Motorcycle	15,445.28	Gasoline	26,102.52	Gasoline
Total	226,273.35	---	373,975.86	383,639.29

[19] www.hybridcars.com

[20] Biodiesel Supply and Consumption. Supplement to the Short-Term Energy Outlook. Energy Information Administration. April 2009. Accessed at http://www.eia.doe.gov/emeu/steo/pub/special/2009_sp_01.pdf on May 6, 2009.

Employee business travel is usually included in a City government GHG Inventory per protocol; however, we could not include it in this baseline analysis due to data limitations. The City maintains financial records of when employees travel by air or vehicle to conferences and other events; however, it does not keep records of business travel destinations. As such, this Inventory could not accurately account for GHG emissions from employee business travel that occurred via mode other than in City fleet vehicles. A minor adjustment to City recordkeeping would allow the data to be included in the next City government operations GHG inventory.

4.5 STREETLIGHTS AND TRAFFIC SIGNALS

The electricity consumed by City streetlights and traffic signals in calendar year 2005 resulted in approximately 102 metric tons of CO_2e, or approximately 5.4% of total City government emissions. This Inventory accounts for 4 Caltrans owned and 2 City owned traffic signals, and an unknown number of streetlights.

4.6 WATER AND WASTEWATER

In 2005, electricity and natural gas consumption from wastewater facilities in the City emitted approximately 334 metric tons of CO_2e, or 19.8% of total emissions related to wastewater. This category includes energy use in the Wastewater Treatment Plant buildings and the numerous lift stations and pumps necessary to convey effluent to the treatment plant. Point-source emissions that arise from the wastewater treatment system due to fermentation of discarded biomass and other wastewater treatment processes resulted in an additional 206 metric tons of CO_2e, increasing the percentage of total emissions attributed to wastewater facilities to 28.5%. Calculating emissions from wastewater treatment processes was completed using ICLEI's wastewater emissions calculator. The City's permit from the Air Pollution Control District does not require the City to measure the amount of methane in the biogas released from the digester. The lack of available data necessitated use of an alternative method to calculate emissions using population served by the City's wastewater treatment plant. Using this approach, the emissions calculator assumes the wastewater treatment processes remain constant over time. In reality, the City upgraded the wastewater treatment plant facilities in 2007. It is likely these upgrades to the Wastewater Treatment Plant have reduced the amount of greenhouse gas emissions; however, due to the lack of data available, the forecast emissions do not reflect this reduction.

Electricity consumption from water facilities operated by the City emitted approximately 221 metric tons of CO_2e, or 11.7% of total emissions. This category includes energy use at the various wells and pumps to convey water to City residents as well as irrigation at City parks and facilities.

4.7 SOLID WASTE

Similar to the Community-Wide analysis, waste produced by City facilities was calculated using the methane commitment method. The CACP2009 calculates the methane expected to be released from this landfilled waste over the course of its lifetime. In 2005, South County Sanitary estimates City facilities sent a total of 829.6 metric tons of waste to landfill, producing 267 metric tons of CO_2e, or 14.1% of total emissions. Unlike other sectors analyzed, the emissions from waste disposed of in 2005 will occur over multiple years as the waste breaks down over time. This category includes only those emissions generated by waste produced at City facilities and does not include the total emissions released from the landfill.

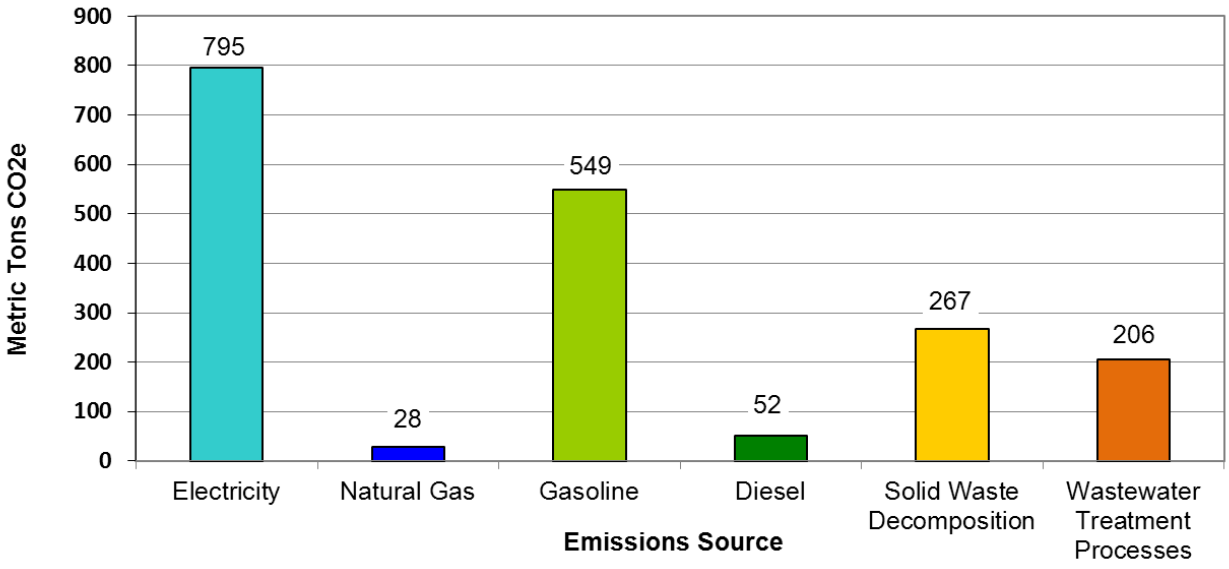
4.8 CITY EMISSIONS BY SOURCE

It can also be helpful to view overall City government emissions by source. As shown in **Table 4.5** and **Figure 4.5**, the majority of emissions are from electricity (41.9%) consumption in City-owned buildings, streetlights, and water/sewage facilities, and gasoline (28.9%) consumed by the vehicle fleets and employee travel to work. Solid waste contributed to 14.1% of total emissions while wastewater treatment processes contributed to 10.9%. Diesel and natural gas contributed to the remaining 4.2% of the overall City greenhouse gas emissions.

TABLE 4-5: CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SOURCE, 2005

City Emissions 2005 by Source	CO_2e (metric tons)	CO_2e (percent of total)
Electricity	795	41.9%
Natural Gas	28	1.5%
Gasoline	549	28.9%
Diesel	52	2.7%
Solid Waste Decomposition	267	14.1%
Wastewater Treatment Processes	206	10.9%
TOTAL	1,897	100.0%

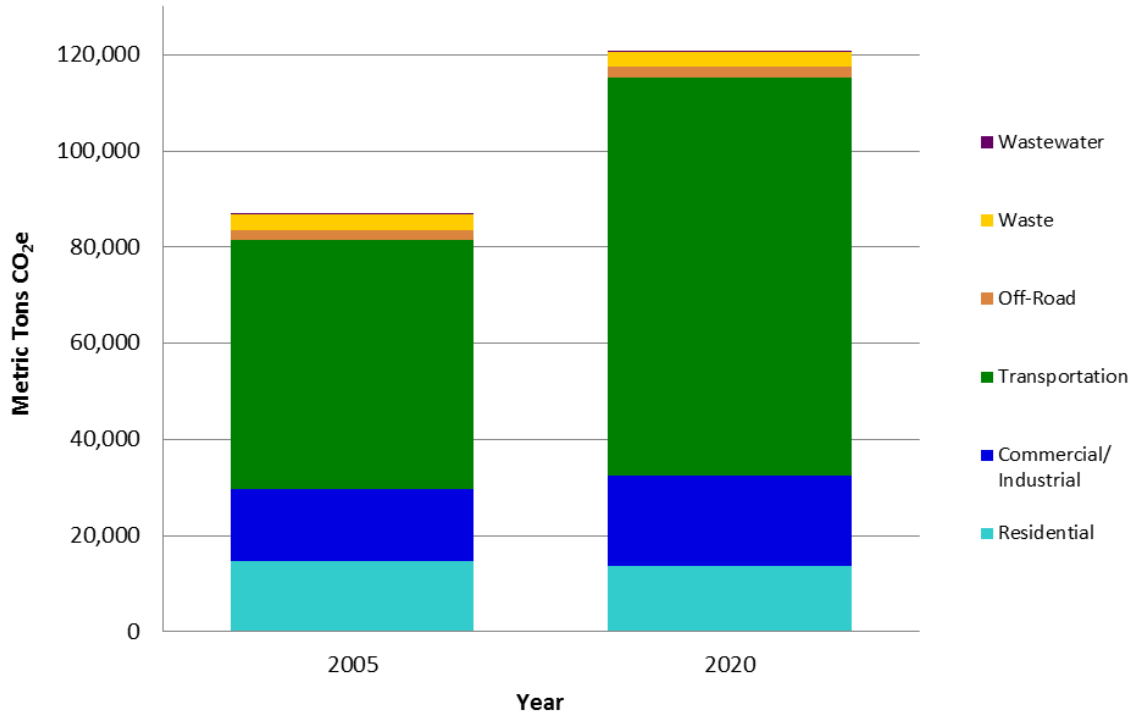
FIGURE 4-5: CITY GOVERNMENT OPERATIONS GHG EMISSIONS BY SOURCE, 2005



5. Forecast

The emissions forecast for the City of Pismo Beach represents a business-as-usual prediction of how community-wide GHG levels will change over time if consumption trends and behavior continue as they did in 2005. These predictions are based on the community inventory results included in this report and statistics on job and population growth from the San Luis Obispo Council of Governments. The analysis shows that if behavior and consumption trends continue as business-as-usual, emissions will reach 120,801 metric tons of CO_2e by 2020, or a 38.7% increase over 2005 baseline levels (see **Figure 5-1**).

FIGURE 5-1: 2020 BUSINESS-AS-USUAL PROJECTED GROWTH IN COMMUNITY-WIDE GHG EMISSIONS



The forecast does not quantify emissions reductions from State or federal activities including AB 32, the renewable portfolio standard, and SB 375. Additionally, it does not take into account reduction activities already underway or completed since 2005, the results of which likely put the community's emissions on a track well below the business-as-usual linear projection.

Forecasts were performed by applying job and population growth rates to 2005 community-wide greenhouse gas emissions levels. Estimated population and job figures for 2020 were obtained from mid-range projections identified in the San Luis Obispo Council of Governments report, “San Luis Obispo County 2040 Population, Housing & Employment Forecast” (August 2011).

City government operations emissions are not separately analyzed as part of this forecast due to a lack of reasonable growth indicators for the City government sector. However, an increase in emissions is not expected for existing facilities and operations in the City government operations sector. If anything, the City expects that emissions within the scope of the 2005 City government operations inventory will decrease because of energy efficiency improvements and fleet upgrades. While the city is close to build-out and major expansion of City services is not anticipated, the cumulative effect of upgrades and minor expansion of services and infrastructure have the potential to add new sources of emissions to the City government operations inventory that did not exist in 2005.

6. Conclusion and Next Steps

The City of Pismo Beach has made a formal commitment to reduce its greenhouse gas emissions. This report lays the groundwork for those efforts by estimating baseline emission levels against which future progress can be demonstrated.

This analysis found that the community was responsible for emitting 87,077 metric tons of CO_2e in the base year 2005, with the transportation sector contributing the most (59.5%) to this total. As a component of the community-wide analysis, City government operations produced 1,897 metric tons of CO_2e, or 2.2% of the total. In addition to establishing the baseline for tracking progress over time, this report serves to identify the major sources of city emissions, and therefore the greatest opportunities for emission reductions. In this regard, the emissions inventory will inform the focus of the City's Climate Action Plan. If no action is taken, this report found that business-as-usual emissions will likely rise by 38.7% by 2020.

As the City moves forward to the next milestones in the process, including designation of emission reduction targets and development of a Climate Action Plan, the City should identify and quantify the emission reduction benefits of projects that have already been implemented since 2005, as well as the emissions reduction benefits of existing General Plan policies. The benefits of existing strategies can be tallied against the baseline established in this report to determine the appropriate set of strategies that will deliver the City to its chosen emissions reduction goal.

APPENDIX A:
CACP DETAILED REPORT FOR COMMUNITY-WIDE EMISSIONS, 2005

Community Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)
Residential						
San Luis Obsipo APCD, CA						
1 SoCal Gas Company Natural Gas - Residential						
Natural Gas	9,435	18	889	9,459	10.9	177,809
Subtotal 1 SoCal Gas Compan	9,435	18	889	9,459	10.9	177,809

Updated data provided by Paulo Morais, Customer Programs Environmental Affairs (213) 244-3246, pmorais@semprautilities.com, May 2012.

Emissions factors from Local Government Operations Protocol Version 1.1.

2 PG&E Electricity - Residential						
Electricity	5,305	119	325	5,349	6.2	81,631
Subtotal 2 PG&E Electricity - R	5,305	119	325	5,349	6.2	81,631

Source: Jillian Rich, jillian.rich@pge.com and John Joseph, ghgdatarequests@pge.com, PG&E.
1. The "PG&E California" electricity coefficient set is based on the 2005 PG&E eCO2 emission factor of 0.489 lbs/kWh of delivered electricity as update on June 27, 2011 and provided by PG&E. PG&E's third-party-verified GHG inventory submitted to the California Climate Action Registry (CCAR)6 (2003-2008) or The Climate Registry (TCR) (2009).

The "PG&E California" electricity coefficient set is based on the 2005 PG&E eCO2 emission factor of 0.489 lbs/kWh of delivered electricity. This emissions factor is certified by the California Climate Action Regisry. Criteria air pollutant emission factors for electricity are derived from the Local Government Operations Protocol version 1.1

Subtotal Residential	14,740	137	1,215	14,808	17.0	259,440
Commercial						
San Luis Obsipo APCD, CA						
1 SoCal Gas Company Natural Gas - Commercial + Industrial						
Natural Gas	6,954	13	655	6,972	8.0	131,061
Subtotal 1 SoCal Gas Compan	6,954	13	655	6,972	8.0	131,061

Updated data provided by Paulo Morais, Customer Programs Environmental Affairs (213) 244-3246, pmorais@semprautilities.com, May 2012.

Emissions factors from Local Government Operations Protocol Version 1.1.

Commercial/Industrial sectors aggregated due to privacy laws.

2 PG&E Electricity - Commercial + Industrial						
Electricity	7,921	178	486	7,986	9.2	121,875
Subtotal 2 PG&E Electricity - C	7,921	178	486	7,986	9.2	121,875

Source: Jillian Rich, jillian.rich@pge.com and John Joseph, ghgdatarequests@pge.com, PG&E.

This report has been generated for San Luis Obsipo APCD, CA using ICLEI's Clean Air and Climate Protection 2009 Software.

Community Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)

1. The "PG&E California" electricity coefficient set is based on the 2005 PG&E eCO2 emission factor of 0.489 lbs/kWh of delivered electricity as update on June 27, 2011 and provided by PG&E. PG&E's third-party-verified GHG inventory submitted to the California Climate Action Registry (CCAR)6 (2003-2008) or The Climate Registry (TCR) (2009). Criteria air pollutant emission factors for electricity are derived from the Local Government Operations Protocol version 1.1.

2. Commercial and Industrial electricity are combined due to the 15/15 Rule, which was adopted by the CPUC in the Direct Access Proceeding (CPUC Decision 97-10-031) to protect customer confidentiality. The 15/15 rule requires that any aggregated information provided by the Utilities must be made up of at least 15 customers and a single customer'

Subtotal Commercial	14,875	191	1,141	14,958	17.2	252,936

Waste

San Luis Obsipo APCD, CA

3 Solid Waste - Chicago Grade — *Disposal Method - Managed Landfill*

Paper Products	0	0	980	21	0.0
Food Waste	0	0	384	8	0.0
Plant Debris	0	0	103	2	0.0
Wood or Textiles	0	0	288	6	0.0
Subtotal 3 Solid Waste - Chica	0	0	1,756	37	0.0

Waste share from the California Integrated Management Board (CIWMB) 2004 Statewide Waste Characterization Study. Emissions factors from the Local Government Operations Protocol version 1.1

3 Solid Waste - Cold Canyon Landfill — *Disposal Method - Managed Landfill*

Paper Products	0	0	91,517	1,922	2.2
Food Waste	0	0	35,891	754	0.9
Plant Debris	0	0	9,631	202	0.2
Wood or Textiles	0	0	26,875	564	0.6
Subtotal 3 Solid Waste - Cold C	0	0	163,914	3,442	4.0

Source(s):
1. Total waste tonnage for the City in 2005 provided by the 2005 Disposal Quarterly Reports prepared by San Luis Obispo County Integrated Waste Management Authority on 6/17/05, 9/27/05, 12/27/05 and 3/6/06, provided by Peter Cron, pcron@iwma.com.

2. Percentages of waste share by type for landfill tonnage provided by CIWMB 2004 Statewide Waste Characterization Study. http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

Notes:
1. Waste Type data not collected by landfill. State average waste characterization data is used for residential, commercial and self haul waste.

2. Chicago Grade landfill reports a methane recovery factor of 60%. Chicago Grade total gas generated = 157.47 mmcf/yr. Total gas transferred = 94.48 mmcf/yr.

Community Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)

3. Cold Canyon landfill reports a methane recovery factor of 60%. Cold Canyon total gas generated = 700 mmcf/yr. Total gas transferred = 420 mmcf/yr.

Subtotal Waste	0	0	165,670	3,479	4.0	

Other

San Luis Obsipo APCD, CA

1 - On-Road Transportation

Carbon Dioxide	51,811	0	0	51,811	59.6	
Subtotal 1 - On-Road Transpor	51,811	0	0	51,811	59.6	

Sources:

- Average weekday vehicle miles traveled (VMT) were provided by Fehr & Peers, July 2012, using the San Luis Obispo Regional Travel Demand model.
- Transportation-related GHG emissions (carbon dioxide, methane, and nitrous oxide) were calculated using California Air Resources Board's Emissions Factor (EMFAC2011) software and converted to CO2e.

Notes:

- Using origin-destination analysis, three types of vehicle trips were tracked separately for AM and PM peak periods in the City:
  1. Internal-Internal: Vehicle trips that remained inside the city
  2. Internal-External and External-Internal: Vehicle trips that have an ending or a beginning in the city
  3. External-External: Vehicle trips that pass through the city without originating or ending in the city
- Using the recommendation of the Regional Target Advisory Committee (RTAC), the body responsible for Senate Bill 375 target setting, vehicle miles traveled (VMT) from trips of type 1, 2, and 3 were counted 100%, 50%, and 0% respectively toward jurisdiction-generated VMT.
- Transportation-related greenhouse gas emissions were calculated using the EMFAC2011 software. EMFAC2011 provides carbon dioxide, methane, and nitrous oxide emissions according to the unique vehicle composition of each county in California. Of the total on-road transportation emissions 93.2% are the result of gasoline consumption and 6.8% are the result of diesel fuel consumption.

1 Off-Road Vehicles & Equipment

Carbon Dioxide	1,821	0	0	1,821	2.1	
Methane	0	0	5	0	0.0	
Nitrous Oxide	0	0	0	0	0.0	
Subtotal 1 Off-Road Vehicles &	1,821	0	5	1,821	2.1	

1. CO2, CH4 and N2O emissions calculated using the California Air Resources Board OFFROAD2007 modeling tool.
2. Accounts for emissions from lawn & garden equipment, industrial equipment, construction equipment, light commercial equipment, and agricultural equipment.
3. The portion of lawn & garden equipment was calculated based on share of countywide households; construction equipment based on share of countywide construction jobs; industrial equipment based on share of countywide industrial jobs; light commercial equipment based on share of countywide commercial jobs; agricultural equipment based on share of agricultural land using GIS county shape files.

Community Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)
Construction equipment - 961 MT CO2e Industrial Equipment - 118 MT CO2e Lawn & Garden Equipment -311 MT CO2e Light Commercial Equipment - 407 MT CO2e Agricultural Equipment - 24 MT CO2e Total Off-Road = 1,821 MT CO2e						
Subtotal Other	53,632	0	5	53,632	61.7	
Total	83,246	329	168,031	86,877	100.0	512,376

APPENDIX B:
CACP DETAILED REPORT FOR CITY GOVERNMENT OPERATIONS EMISSIONS, 2005

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)	Cost ($)
Buildings and Facilities							
San Luis Obsipo APCD, CA							
All Buildings and Facilities							
Electricity	143	3	9	144	8.5	2,204	0
Natural Gas	22	0	2	22	1.3	410	0
Subtotal All Buildings and Faci	165	3	11	166	9.8	2,614	0

Updated natural gas data provided by Paulo Morais, Customer Programs Environmental Affairs (213) 244-3246, pmorais@semprautilities.com, May 2012.

Update electricity data provided by Jillian Rich, jillian.rich@pge.com and John Joseph, ghgdatarequests@pge.com, PG&E, May 2012.

The "PG&E California" electricity coefficient set is based on the 2005 PG&E eCO2 emission factor of 0.489 lbs/kWh of delivered electricity as update on June 27, 2011 and provided by PG&E. PG&E's third-party-verified GHG inventory submitted to the California Climate Action Registry (CCAR) (2003-2008) or The Climate Registry (TCR) (2009).

Coefficients for natural gas from Local Government Operations Protocol version 1.1.

Subtotal Buildings and Facilities	165	3	11	166	9.8	2,614	0
Streetlights & Traffic Signals							
San Luis Obsipo APCD, CA							
All Streetlights & Traffic Control							
Electricity	102	2	6	102	6.1	1,564	0
Subtotal All Streetlights & Traff	102	2	6	102	6.1	1,564	0

Jillian Rich, jillian.rich@pge.com and John Joseph, ghgdatarequests@pge.com, PG&E.
1. The "PG&E California" electricity coefficient set is based on the 2005 PG&E eCO2 emission factor of 0.489 lbs/kWh of delivered electricity as update on June 27, 2011 and provided by PG&E. PG&E's third-party-verified GHG inventory submitted to the California Climate Action Registry (CCAR)6 (2003-2008) or The Climate Registry (TCR) (2009).

Subtotal Streetlights & Traffic Si	102	2	6	102	6.1	1,564	0
Water Delivery Facilities							
San Luis Obsipo APCD, CA							
All Water Delivery Facilities							
Electricity	219	5	13	221	13.1	3,367	0
Subtotal All Water Delivery Fac	219	5	13	221	13.1	3,367	0

Updated electricity data provided by Jillian Rich, jillian.rich@pge.com and John Joseph, ghgdatarequests@pge.com, PG&E, May 2012.

This report has been generated for San Luis Obsipo APCD, CA using ICLEI's Clean Air and Climate Protection 2009 Software.

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)	Cost ($)

1. The "PG&E California" electricity coefficient set is based on the 2005 PG&E eCO2 emission factor of 0.489 lbs/kWh of delivered electricity as update on June 27, 2011 and provided by PG&E. PG&E's third-party-verified GHG inventory submitted to the California Climate Action Registry (CCAR)6 (2003-2008) or The Climate Registry (TCR) (2009).

Subtotal Water Delivery Facilities	219	5	13	221	13.1	3,367	0
Wastewater Facilities							
San Luis Obsipo APCD, CA							
All Wastewater Facilities							
Electricity	325	7	20	328	19.4	5,001	0
Natural Gas	6	0	1	6	0.4	122	0
Subtotal All Wastewater Facilit	332	7	21	334	19.8	5,123	0

Updated natural gas data provided by Paulo Morais, Customer Programs Environmental Affairs (213) 244-3246, pmorais@semprautilities.com, May 2012.

Update electricity data provided by Jillian Rich, jillian.rich@pge.com and John Joseph, ghgdatarequests@pge.com, PG&E, May 2012.

Subtotal Wastewater Facilities	332	7	21	334	19.8	5,123	0
Solid Waste Facilities							
San Luis Obsipo APCD, CA							
All City Facilities							
Carbon Dioxide	267	0	0	267	15.8	0	0
Subtotal All City Facilities	267	0	0	267	15.8	0	0
Subtotal Solid Waste Facilities	267	0	0	267	15.8	0	0
Vehicle Fleet							
San Luis Obsipo APCD, CA							
1 - Building							
Gasoline	9	0	0	9	0.6	137	2,680
Subtotal 1 - Building	9	0	0	9	0.6	137	2,680

All data obtained from fuel billing records provided by Susan West-Jones (swjones@pismobeach.org). Light Trucks MY 1999 includes 1 - Ford Expedition. Light Trucks MY 2001 includes 1 - Ford Explorer

The City switched fuel providers midway through 2005. Sebastian Oil Distributor recorded fuel purchases by credit card ID. Fuel credit cards were assigned to City employees, not fleet vehicles. As a result, fuel purchases could not be linked to specific vehicles. Comdata Corportation reported fuel purchases by vehicle license plate number, thus fuel purchase were linked with specific vehicles. To distribute fuel purchased through Sebastain Oil, employees were divided into their respective City departments. The total fuel purchased through Sebastain Oil was calculated for each department

Government Greenhouse Gas Emissions in 2005
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	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)

and distributed based on percentage of known fuel consumed by specific vehicles based on Comdata's fuel billing records.

1 - Fire

Diesel	20	0	0	20	1.2	269	0
Gasoline	13	1	1	13	0.8	186	0
Subtotal 1 - Fire	32	1	2	32	1.9	455	0

All data obtained from fuel billing records provided by Susan West-Jones (swjones@pismobeach.org). Heavy Duty Vehicles All MYs includes 1 - KME Fire Engine, 1 - 1989 Pierce/Lane Fire Engine, 1997 Spartan Fire Engine, and 1 - Chevy 350. Heavy Duty Vehicles MY 1990 to 1995 includes 1 - 1993 Ford F450. Light Trucks MY 1999 includes 1 - Ford Explorer. Light Trucks MY 2005 includes 1 - 2006 Ford F250.

The City switched fuel providers midway through 2005. Sebastian Oil Distributor recorded fuel purchases by credit card ID. Fuel credit cards were assigned to City employees, not fleet vehicles. As a result, fuel purchases could not be linked to specific vehicles. Comdata Corportation reported fuel purchases by vehicle license plate number, thus fuel purchase were linked with specific vehicles. To distribute fuel purchased through Sebastain Oil, employees were divided into their respective City departments. The total fuel purchased through Sebastain Oil was calculated for each department and distributed based on percentage of known fuel consumed by specific vehicles based on Comdata's fuel billing records.

1 - Miscellaneous

Diesel	5	0	0	5	0.3	65	0
Gasoline	14	1	1	15	0.9	208	0
Subtotal 1 - Miscellaneous	19	1	1	19	1.1	273	0

All data obtained from fuel billing records provided by Susan West-Jones (swjones@pismobeach.org). Passenger Cars Alt. Method includes fuel consumption for unknown vehicle make/model/year. Light Trucks Alt. Method includes diesel fuel consumption for unknown vehicle make/model/year. This information could not be linked to a City department.

1 - Parks

Gasoline	22	1	1	23	1.3	326	7,693
Subtotal 1 - Parks	22	1	1	23	1.3	326	7,693

All data obtained from fuel billing records provided by Susan West-Jones (swjones@pismobeach.org). Light Trucks MY 1987 to 1993 includes 1 - 1990 GMC 1500 4X4 and 1 - 1992 Ford F250. Light Trucks MY 1999 includes 1 - Ford F350. Light Trucks MY 2001 includes 1 - Ford F350. Light Trucks MY 2003 includes 1 - Ford F250 4X4.

The City switched fuel providers midway through 2005. Sebastian Oil Distributor recorded fuel purchases by credit card ID. Fuel credit cards were assigned to City employees, not fleet vehicles. As a result, fuel purchases could not be linked to specific vehicles. Comdata Corportation reported fuel purchases by vehicle license plate number, thus fuel purchase were linked with specific vehicles. To distribute fuel purchased through Sebastain Oil, employees were divided into their respective City departments. The total fuel purchased through Sebastain Oil was calculated for each department and distributed based on percentage of known fuel consumed by specific vehicles based on Comdata's fuel billing records.

1 - Police

Gasoline	137	3	4	138	8.1	2,011	0
Subtotal 1 - Police	137	3	4	138	8.1	2,011	0

All data obtained from fuel billing records provided by Susan West-Jones (swjones@pismobeach.org). Passenger Cars MY 2001 includes 1 - Ford Crown Victoria. Passenger Cars MY 2000 includes 1 - Ford Crown Victoria. Passenger Cars MY 2002 includes 2 - Ford Crown Victoria and 1 - Toyota Camry. Passenger Cars MY 2003 includes 1 - Ford Taurus. Passenger Cars MY 2004 includes 2 - Ford Crown Victoria, 2 - BMW 650 Motorcycle, 2 BMW 1150 Motorcycle. Light Trucks MY 1997 includes 1 - Ford Explorer. Light Trucks MY 2003 includes 1 - Ford Explorer and 1 - Ford Pickup. Light Trucks MY 2004 includes 1 - Ford Explorer.

Government Greenhouse Gas Emissions in 2005
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	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	(%)	Energy (MMBtu)	Cost ($)

The City switched fuel providers midway through 2005. Sebastian Oil Distributor recorded fuel purchases by credit card ID. Fuel credit cards were assigned to City employees, not fleet vehicles. As a result, fuel purchases could not be linked to specific vehicles. Comdata Corportation reported fuel purchases by vehicle license plate number, thus fuel purchase were linked with specific vehicles. To distribute fuel purchased through Sebastain Oil, employees were divided into their respective City departments. The total fuel purchased through Sebastain Oil was calculated for each department and distributed based on percentage of known fuel consumed by specific vehicles based on Comdata's fuel billing records.

1 - Public Works

Gasoline	6	0	0	7	0.4	96	2,196
Subtotal 1 - Public Works	6	0	0	7	0.4	96	2,196

All data obtained from fuel billing records provided by Susan West-Jones (swjones@pismobeach.org). Light Trucks MY 2002 includes 1 - Ford Expedition.

The City switched fuel providers midway through 2005. Sebastian Oil Distributor recorded fuel purchases by credit card ID. Fuel credit cards were assigned to City employees, not fleet vehicles. As a result, fuel purchases could not be linked to specific vehicles. Comdata Corportation reported fuel purchases by vehicle license plate number, thus fuel purchase were linked with specific vehicles. To distribute fuel purchased through Sebastain Oil, employees were divided into their respective City departments. The total fuel purchased through Sebastain Oil was calculated for each department and distributed based on percentage of known fuel consumed by specific vehicles based on Comdata's fuel billing records.

1 - Streets

Gasoline	32	2	2	32	1.9	466	9,928
Subtotal 1 - Streets	32	2	2	32	1.9	466	9,928

All data obtained from fuel billing records provided by Susan West-Jones (swjones@pismobeach.org). Light Trucks MY 1995 includes 1 - GMC 3500 4X4. Light Trucks MY 2000 includes 1 - Ford F350. Light Trucks MY 2003 includes 1 - F150 4X4. Light Trucks MY 2005 includes 1 - Ford F350.

The City switched fuel providers midway through 2005. Sebastian Oil Distributor recorded fuel purchases by credit card ID. Fuel credit cards were assigned to City employees, not fleet vehicles. As a result, fuel purchases could not be linked to specific vehicles. Comdata Corportation reported fuel purchases by vehicle license plate number, thus fuel purchase were linked with specific vehicles. To distribute fuel purchased through Sebastain Oil, employees were divided into their respective City departments. The total fuel purchased through Sebastain Oil was calculated for each department and distributed based on percentage of known fuel consumed by specific vehicles based on Comdata's fuel billing records.

1 - Wastewater

Gasoline	20	2	1	21	1.3	301	6,262
Subtotal 1 - Wastewater	20	2	1	21	1.3	301	6,262

All data obtained from fuel billing records provided by Susan West-Jones (swjones@pismobeach.org). Light Trucks MY 1990 includes 1 - Ford Bronco. Light Trucks MY 1998 includes 2 - Ford F150. Light Trucks MY includes 1 - Ford Ranger 4X4. Light Trucks MY 2000 includes 1 - Ford F550. Light Trucks MY 2003 includes 1 - Ford F250 4X4.

The City switched fuel providers midway through 2005. Sebastian Oil Distributor recorded fuel purchases by credit card ID. Fuel credit cards were assigned to City employees, not fleet vehicles. As a result, fuel purchases could not be linked to specific vehicles. Comdata Corportation reported fuel purchases by vehicle license plate number, thus fuel purchase were linked with specific vehicles. To distribute fuel purchased through Sebastain Oil, employees were divided into their respective City departments. The total fuel purchased through Sebastain Oil was calculated for each department and distributed based on percentage of known fuel consumed by specific vehicles based on Comdata's fuel billing records.

Government Greenhouse Gas Emissions in 2005
Detailed Report

	CO_2 (tonnes)	N_2O (kg)	CH_4 (kg)	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MMBtu)	Cost ($)
1 - Water							
Gasoline	17	0	0	17	1.0	249	4,829
Subtotal 1 - Water	17	0	0	17	1.0	249	4,829

All data obtained from fuel billing records provided by Susan West-Jones (swjones@pismobeach.org). Light Trucks MY 2001 includes 1 - Ford F350 4X4.

The City switched fuel providers midway through 2005. Sebastian Oil Distributor recorded fuel purchases by credit card ID. Fuel credit cards were assigned to City employees, not fleet vehicles. As a result, fuel purchases could not be linked to specific vehicles. Comdata Corportation reported fuel purchases by vehicle license plate number, thus fuel purchase were linked with specific vehicles. To distribute fuel purchased through Sebastain Oil, employees were divided into their respective City departments. The total fuel purchased through Sebastain Oil was calculated for each department and distributed based on percentage of known fuel consumed by specific vehicles based on Comdata's fuel billing records.

Subtotal Vehicle Fleet	295	11	11	298	17.7	4,313	33,588
Employee Commute							
San Luis Obsipo APCD, CA							
3 - Employee Commute							
Biodiesel (B100)	0	0	0	0	0.0	5	0
Diesel	27	0	0	27	1.6	375	0
Gasoline	267	19	28	274	16.2	3,935	0
Subtotal 3 - Employee Commu	295	19	28	301	17.8	4,316	0
Subtotal Employee Commute	295	19	28	301	17.8	4,316	0
Total	1,673	48	91	1,690	100.0	21,296	33,588

APPENDIX C:
DETAILED METHODOLOGY FOR COMMUNITY-WIDE INVENTORY

APPENDIX C: DETAILED METHODOLOGY FOR COMMUNITY-WIDE INVENTORY

Detailed Methodology for Community-Wide Inventory

This appendix provides the detailed methodology and data sources used for calculating GHG emissions in each sector of the community-wide inventory.

OVERVIEW OF INVENTORY CONTENTS AND APPROACH

The community inventory methodology is based on guidance from ICLEI International Local Government GHG Emissions Analysis Protocol (IEAP) (October 2009) and the Association of Environmental Professionals California Community-wide GHG Baseline Inventory Protocol (AEP Protocol) (June 2011). The community inventory identifies and quantifies emissions from the residential, commercial/industrial, transportation, off-road, and solid waste sectors. Emissions are calculated by multiplying activity data—such as kilowatt hours or gallons of gasoline consumed—by emissions factors, which provide the quantity of emissions per unit of activity. Activity data is typically available from electric and gas utilities, planning and transportation agencies and air quality regulatory agencies. Emissions factors are drawn from a variety of sources, including the California Climate Action Registry, the Local Governments Operations Protocol (LGOP) version 1.1 (May 2010), and air quality models produced by the California Air Resources Board.

In this inventory, all GHG emissions are converted into carbon dioxide equivalent units, or CO_2e, per guidance in the LGOP version 1.1, AEP Protocol, and IEAP. The LGOP provides standard factors to convert various greenhouse gases into carbon dioxide equivalent units; these factors are known as Global Warming Potential factors, representing the ratio of the heat-trapping ability of each greenhouse gas relative to that of carbon dioxide.

The following sections describe the specific data sources and methodology for calculating GHG emissions in each community sector.

RESIDENTIAL AND COMMERCIAL/INDUSTRIAL SECTORS

All residential and commercial/industrial sector emissions are the result of electricity consumption and the on-site combustion of natural gas. Pacific Gas and Electric Company (PG&E) and Southern California Gas Company (SoCal Gas Co.) provided residential electricity and natural gas consumption data. Specifically, data was provided by:

- Jillian Rich, Program Manager with PG&E Green Communities and Innovator Pilots (jillian.rich@pge.com), and John Joseph, PG&E GHG Data Requests

- Paulo Morais, Energy Programs Supervisor with Southern California Gas Company, Customer Programs (pmorias@semprautilities.com)

The raw data received from PG&E and SoCal Gas Co. is summarized in **Tables 1** and **2** below. This raw data was input into the CACP2009 software in kWh and therms. PG&E provided a 2005 carbon dioxide (CO_2) coefficient for electricity use and SoCal Gas Co. provided a carbon dioxide (CO_2) coefficient for natural gas (see "electricity and natural gas coefficients" section). Emissions coefficients for methane (CH_4) and nitrogen dioxide (N_2O) emissions were provided by the California LGOP version 1.1 and were converted into carbon dioxide equivalents and added to the CO_2 emissions to obtain carbon dioxide equivalent (CO_2e) emissions.

All commercial/industrial sector emissions are the result of electricity consumption and the on-site combustion of natural gas. Commercial and industrial electricity were combined into one section by PG&E due to the California 15/15 Rule. The 15/15 Rule was adopted by the California Public Utilities Commission (CPUC) in the Direct Access Proceeding (CPUC Decision 97-10-031) to protect customer confidentiality. The 15/15 Rule requires that any aggregated information provided by the utilities must be made up of at least 15 customers. A single customer's load must be less than 15% of an assigned category. If the number of customers in the complied data is below 15, or if a single customer's load is more than 15% of the total data, categories must be combined before the information is released. The rule further requires that if the 15/15 Rule is triggered for a second time after the data has been screened already using the 15/15 Rule, the customer must be dropped from the information provided. As a result, PG&E aggregated commercial and industrial energy consumption into one report, whereas SoCal Gas Co. separated commercial and industrial gas usage (shown in the chart below) into two reports. It would have been misleading to present an "Industrial" category for only natural gas emissions; therefore, the SoCal Gas Co. emissions were aggregated with commercial as well.

TABLE 1: RESIDENTIAL ENERGY USE

2005 Residential Energy Emissions	Scope	Input Data Metric Tons	Metric Tons CO_2e per year
PG&E Electricity	2	23,917,883 kWh	5,349
SoCal Gas Co. Natural Gas	1	1,778,089 Therms	9,459

TABLE 2: COMMERCIAL/INDUSTRIAL ENERGY USE

2005 Commercial / Industrial Energy Emissions	Scope	Input Data	Metric Tons CO_2e per year
PG&E Commercial + Industrial Electricity	2	35,709,251kWh	7,986
SoCal Gas Co. Commercial + Industrial Natural Gas	1	1,310,611 Therms	6,972

To make the Inventory more accurate and representative of the city's real impact on climate change, tailored coefficient sets were obtained from PG&E and the LGOP version 1.1. Sources and coefficient values are summarized in the table below.

TABLE 3: ELECTRICITY COEFFICIENT SETS

Coefficient Set	Unit	Value	Source
Average Grid Electricity Set	Lbs/ MWh	489 CO_2 0.011 N_2O 0.03 CH_4	Jillian Rich, Program Manager with PG&E Green Communities and LGOP version 1.1

TABLE 4: NATURAL GAS COEFFICIENT SETS

Coefficient Set	Unit	Value	Source
Fuel CO_2 (Natural Gas) Set	kg/MMBtu	53.06 CO_2	Coefficient set provided by LGOP version 1.1
RCI Average Set – Residential	kg/MMBtu	0.0001 N_2O 0.005 CH_4	Coefficient set provided by LGOP version 1.1
RCI Average Set – Commercial + Industrial	kg/MMBtu	0.0001 N_2O 0.005 CH_4	Coefficient set provided by LGOP version 1.1

TRANSPORTATION SECTOR

On-road transportation emissions were derived from local jurisdiction vehicle miles traveled (VMT) data and regional vehicle and travel characteristics. The transportation analysis, conducted by Fehr & Peers, utilized the San Luis Obispo Council of Governments (SLOCOG)

Regional Travel Demand model to develop transportation-related GHG emissions data and VMT for trips that have an origin and/or destination in the city.

The SLOCOG Travel Demand Model was recently updated and validated to reflect 2010 conditions and to comply with the Regional Transportation Plan (RTP) guidelines on implementation of Senate Bill 375 (SB 375). The update included expanding the times of day, calibration of multiple modes, and reflecting the auto and of non-auto RTP transportation system, all beneficial when quantifying potential GHG reduction strategies. A 2005 land use scenario was developed by extrapolating 2035 and 2010. Similarly, a 2020 land use scenario was developed by interpolating between 2010 and 2035. See *Summary for the San Luis Obispo Council of Governments Model Improvement Project to Meet the Requirements of California Transportation Commission Guidelines for Regional Transportation Plans in Response to SB 375* (February 2012) for details on model calibration and validation.

Using the model, Fehr & Peers allocated vehicle trips and VMT to each of the cities in San Luis Obispo County and the unincorporated county by weighting trips based on their origin and destination. The VMT summarized for land use with each of the incorporated cities and unincorporated county includes:

a) All of the VMT associated with trips made completely internally within each jurisdiction;

b) Half of the VMT generated by jobs and residences located within each jurisdiction but that travels to/from external destinations (this is consistent with the recent SB 375 Regional Targets Advisory Committee (RTAC) decision that the two generators of an inter-jurisdictional trip should each be assigned half of the responsibility for the trip and its VMT); and

c) None of the responsibility for travel passing completely through the jurisdiction with neither an origin point, or a destination within the city (also consistent with RTAC decision).

The gateways exiting the model area were included in the VMT calculation. This means that a jurisdiction will be held responsible for some VMT occurring outside of the model borders. For example, if a household in Pismo Beach travels across the Santa Maria Bridge to Santa Barbara, or through San Luis Obispo City to reach King City.

To capture the effects of congestion, the model VMT for each time period were summarized by speed for each time period and then aggregated to daily. The VMT results are summarized in **Table 5** for the baseline year (2005) and **Table 6** for 2020.

TABLE 5: VEHICLE MILES TRAVELED PER JURISDICTION, 2005

Vehicle Miles Traveled per Jurisdiction, 2005	Vehicle Miles Traveled (VMT)	
	Average Weekday Daily	Average Annual[1]
Arroyo Grande	231,019	80,163,593
Atascadero	375,925	130,445,975
Grover Beach	116,140	40,300,580
Morro Bay	140,915	48,897,505
Paso Robles	424,515	147,306,705
Pismo Beach	324,400	112,566,800
San Luis Obispo	2,280,295	791,262,365
Unincorporated County	2,635,017	914,350,899
Total	6,528,226	2,265,294,422

1 Average Annual VMT was calculated by applying a multiplier of 347 to average weekday daily VMT to account for the total number of weekdays in one year based on the recommendation from Caltrans.

TABLE 6: VEHICLE MILES TRAVELED PER JURISDICTION, 2020

Vehicle Miles Traveled per Jurisdiction, 2020	Vehicle Miles Traveled (VMT)	
	Average Weekday Daily	Average Annual[1]
Arroyo Grande	267,068	92,672,596
Atascadero	501,605	174,056,935
Grover Beach	153,407	53,232,378
Morro Bay	167,302	58,053,794
Paso Robles	559,372	194,102,084
Pismo Beach	498,453	172,963,018
San Luis Obispo	3,298,712	1,144,653,064
Unincorporated County	3,378,180	1,172,228,460
Total	8,824,099	3,061,962,329

1 Average Annual VMT was calculated by applying a multiplier of 347 to average weekday daily VMT to account for the total number of weekdays in one year based on the recommendation from Caltrans.

The EMFAC2011 model developed by the California Air Resources Board was then used to calculate emissions from the VMT figures above. EMFAC defaults for San Luis Obispo County include regionally-specific information on the mix of vehicle classes and model years, as well as ambient conditions and travel speeds that determine fuel efficiency. Types of emissions accounted for include: running exhaust, idle exhaust, starting exhaust, diurnal, resting loss, running loss, and hot soak. The model estimates carbon dioxide, methane, and nitrous oxide emissions from these factors and inputted vehicle activity data.

WASTE SECTOR

Emissions from the waste sector are an estimate of methane generation from the decomposition of landfilled solid waste in the base year (2005). The methane commitment method embedded in CACP2009 is based on the EPA's Waste Reduction Model (WARM) for calculating lifecycle emissions from waste generated within the jurisdictional boundary of the city in 2005. The analysis does not use the waste-in-place method, which calculates emissions from all waste generated in 2005 and all waste already existing in the landfill before the baseline year.

The waste sector takes into account the waste sent to landfill from city residents, businesses, and institutions. It does not calculate emissions from the total amount of waste sent to county landfills (Cold Canyon and Chicago Grade) in 2005 since those landfills accept waste from the unincorporated county and incorporated cities.

Solid waste tonnage data per jurisdiction was provided by:

- "2005 Disposal Report" by quarter, prepared by the San Luis Obispo Integrated Waste Management Board on 3/6/06. Document provided by Peter Cron, San Luis Obispo County Integrated Waste Management Authority (pcron@iwma.com).

Since the composition of waste sent to landfill in 2005 is unknown for the city, the following statewide average waste composition study was utilized:

- CIWMB 2004 Statewide Waste Characterization Study, http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097.

The Waste Characterization Study's distribution of waste by type was then converted into the five categories included in the CACP2009 software, which resulted in the following waste characterization:

- Paper Products: 21.0%
- Food Waste: 14.6%
- Plant Debris: 6.9%
- Wood/Textiles: 21.8%
- All other waste: 35.7%

The CACP2009 software does not have the ability to assign an individual methane recovery factor to each landfill; therefore, we took a weighted average (60%) based on the portion of waste in each landfill. The methane recovery factors of the landfills are well documented by the San Luis Obispo Air Pollution Control District based on the system operations at that time. **Table 7** includes the methane recovery factors for the Chicago Grade and Cold Canyon landfills. Emissions factors were obtain from the LGOP version 1.1.

TABLE 7: COMMUNITY GENERATED WASTE, 2005

Methane recovery and indicator inputs, 2005	Methane Recovery	Total gas generated (mmcf/yr)	Total gas transferred (mmcf/yr)	Data Source	Waste Tonnage from city, 2005 (tons)
Chicago Grade	60%	157.47	94.48	Data from APCD 2005 Inventory	31,097
Cold Canyon	60%	700.00	420.00	Data from APCD 2005 Inventory	26

OFF-ROAD VEHICLES AND EQUIPMENT SECTOR

Off-road emissions were obtained from the California Air Resources Board's OFFROAD2007 model. The model was run using default equipment population, usage, and efficiency data for San Luis Obispo County. Emissions outputs were scaled to the local jurisdiction level by indicators identified in **Table 8**. Results were converted from short tons per day to metric tons per year. Methane and nitrous oxide emissions were converted to carbon dioxide equivalent units based on the Global Warming Potential factors from LGOP version 1.1.

TABLE 8: COUNTY-WIDE EMISSIONS INDICATORS

Equipment Type	Allocation Indicator	Source
Agricultural Equipment	Acres of cropland	San Luis Obispo County, GIS shape files
Construction and Mining Equipment	Construction and mining jobs	U.S. Census Bureau, Center for Economic Studies, On the Map Tool
Industrial Equipment	Industrial jobs	U.S. Census Bureau, Center for Economic Studies, On the Map Tool
Lawn and Garden Equipment	Households	Economics Research Associates. (July 2006). SLOCOG Long Range Socio-Economic Projections. 2005 baseline data
Light Commercial Equipment	Service and commercial jobs	U.S. Census Bureau, Center for Economic Studies, On the Map Tool

The OFFROAD2007 software calculates emissions from other sources of off-road equipment as well, including recreational vehicles and watercrafts; however these emissions were not included because there was no feasible methodology for separating these emissions per jurisdiction within the county. Population is proven to not be an accurate indicator of consumption rates. To remain consistent with protocol and practice, emissions must be separated in a spatial manner, similar to how highway emissions are determined by road segment length within each jurisdiction. It should also be noted that many location-sources of off-road emissions, such as recreational vehicle emissions, occur in state parks or beaches outside of the jurisdiction of each city or the county.

2020 FORECAST

The GHG emissions forecast provides a “business-as-usual estimate,” or scenario, of how emissions will change in the year 2020 if consumption trends and behavior continue as they did in 2005, absent any new federal, state, regional, or local policies or actions that would reduce emissions. The year 2020 was selected for the forecast in order to maintain consistency with AB 32.

The 2020 forecast calculates business-as-usual growth based on population and job growth rates obtained from the San Luis Obispo Council of Governments' report, "San Luis Obispo

County 2040 Population, Housing & Employment Forecast" (August 2011). Mid-range estimates of growth were used in both instances (**Figures ES-5** and **6-1**). Specifically population growth rates were applied to residential, waste, and wastewater sectors and job growth rates were applied to the commercial/industrial sector. Off-road forecasted emissions were obtained from the OFFROAD2007 software for the year 2020. For the transportation sector, Fehr & Peers provided VMT estimates for the year 2020 as shown in **Table 6** above.

APPENDIX D:
DETAILED METHODOLOGY FOR CITY GOVERNMENT OPERATIONS INVENTORY

APPENDIX D: DETAILED METHODOLOGY FOR GOVERNMENT OPERATIONS INVENTORY

Detailed Methodology for Government Operations GHG Emissions Inventory

The municipal operations inventory follows the LGOP version 1.1, which was adopted in 2010 by CARB and serves as the national standard for quantifying and reporting GHG emissions from local government operations.

BUILDING SECTOR

The building sector includes all emissions from natural gas and electricity consumed in City-owned and - operated buildings and facilities. Pacific Gas and Electric Company (PG&E) and Southern California Gas Company (SoCal Gas Co.) provided municipal electricity and natural gas consumption data respectively. Specifically, data was provided by:

- Jillian Rich, Program Manager with PG&E Green Communities and Innovator Pilots (jillian.rich@pge.com), and John Joseph, PG&E GHG Data Requests
- Paulo Morais, Energy Programs Supervisor with Southern California Gas Company, Customer Programs (pmorias@semprautilities.com)

This raw data was input into the CACP2009 software in kWh and therms. PG&E provided a 2005 carbon dioxide (CO_2) coefficient for electricity use and SoCal Gas Co. provided a carbon dioxide (CO_2) coefficient for natural gas. Emissions coefficients for methane (CH_4) and nitrogen dioxide (N_2O) emissions were provided by the California LGOP version 1.1 and were converted into carbon dioxide equivalents and added to the CO_2 emissions to obtain carbon dioxide equivalent (CO_2e) emissions (see **Appendix C**, **Tables 3** and **4**).

VEHICLE FLEET SECTOR

The vehicle fleet sector includes gasoline and diesel vehicles from the following City departments:

- Building
- Fire
- Parks
- Public Works
- Streets
- Water

- Police
- Wastewater

Gasoline and diesel consumption for calendar year 2005 was obtained from fuel billing statements provided by the Finance Department. Specific sources of data within each organization are outlined in the notes of **Appendix B**. Emissions were calculated using the EMFAC software for the San Luis Obispo region, consistent with the community methodology described in **Appendix C**.

EMPLOYEE COMMUTE SECTOR

Employees were surveyed in June 2009 using an online survey instrument. The questions, attached as **Appendix E**, asked employees about their current commuting patterns. Of those questions, we used the following for our analysis:

- What is your approximate one-way distance to work (in miles)? Please indicate the most direct distance to work, discounting midway destinations that would be taken whether or not you drove to work each day (i.e. dropping off children at school).
- Please indicate the type of transportation you take to work each day in your average work week. Please note that there are two types of carpooling.
  - ◇ Drive alone
  - ◇ Carpool with fellow City employees
  - ◇ Carpool with drivers not employed by the City
  - ◇ Vanpool
  - ◇ Public transit
  - ◇ Motorcycle
  - ◇ Bicycle
  - ◇ Walk
  - ◇ Telecommute
  - ◇ Other
- What type of vehicle do you drive?
- What type of fuel does your vehicle use?
- If you carpool with fellow City employees, how many City employees ride with you? If you carpool with a different number each day, please indicate the average.

APPENDIX D: DETAILED METHODOLOGY FOR GOVERNMENT OPERATIONS INVENTORY

Approximately 52 employees responded to the survey with usable information, meaning that all essential questions were answered. Answers with mileage left blank or with highly inconsistent data (ex: saying they walked three days to work, biked two, and drove five) were omitted. In addition, if a respondent did not describe their 'other' category of transportation, the entry was omitted.

To perform this analysis, we took the following steps:

1) Separate entries by what type of vehicle they own and operate (compact, midsize car, full-size car, small truck, medium-small truck, large truck, motorcycle or "don't drive"). Within each new group, separate the entries by diesel, gasoline or hybrid.

2) For each group of entries with the same vehicle type and technology, multiply the number of miles to work by 2 (to get round-trip estimate) and then by the number of 'drive alone' days for each entry. Multiply the number of miles to work by the number of 'carpool' days (half of the 'drive alone' emissions). Note: If a respondent entered that they motorcycle to work, but own a car as well, the motorcycle miles were moved to the motorcycle category). Adjust for hybrids (see below).

3) Add all miles per vehicle type and technology and multiply by 52.18 work weeks/year.

4) Calculate the multiplier to adjust survey response data to the entire 2005 employee population. In 2005, there were 88 employees. This, divided by the 52 survey entries, gives us our multiplier of 1.69.

5) Multiply the mileage per vehicle per technology type by the multiplier.

6) Divide the number of hybrid miles by 2.2 and add the difference to the 'passenger car' category. This is to account for the large increase in hybrid sales between 2005 and 2009 (Source: Hybridcars.com sales statistics).

7) Multiply the number of biodiesel by 30% and add the remainder to the 'passenger car' diesel category. This is to account for the increase in biodiesel consumption between 2005 and 2009 (Source: DOE sales statistics).

8) Manipulate the vehicle classes to fit the CACP2009 software categories.

9) Enter final miles into the CACP2009 software per vehicle type and fuel.

TABLE 1: 2009 EMPLOYEE COMMUTE SURVEY

Vehicle Group	2009 Survey Results		Adjusted for 2005	
	Annual VMT	Fuel Type		
Light Trucks	22,244.33	Gasoline	37,592.92	Gasoline
	0.00	Diesel	0.00	Diesel
Large Trucks	38,926.28	Gasoline	65,784.41	Gasoline
	9,392.40	Diesel	15,873.16	Diesel
Passenger Vehicle	138,885.77	Gasoline	34,785.80	Gasoline
	0.00	Diesel	3,968.29	Diesel
	1,565.40	Biodiesel	793.66	Biodiesel
Motorcycle	15,445.28	Gasoline	26,102.52	Gasoline
Total	230,760.83	Gasoline	389,106.71	Gasoline
	9,392.40	Diesel	19,841.45	Diesel
	0.00	Biodiesel	793.66	Biodiesel

The CACP2009 software does not provide a method of calculating emissions from hybrid cars. As a result, these emissions were divided by 2.20 based on the difference between average fuel economy of a 2005 Toyota Prius and the average fuel economy included in the 2005 SLO EMFAC data and then entered into the CACP2009 software under 'passenger vehicle' (Source: www.fueleconomy.gov).

STREETLIGHT SECTOR

PG&E provided electricity usage from streetlights in kWh for 2005. The total kWh were entered into the CACP2009 software using the electricity coefficients identified in **Appendix C**.

WATER/ SEWAGE SECTOR

This sector calculates emissions from energy consumption associated with City-owned and operated water and wastewater facilities and operated wastewater facilities and point-source emissions that arise from wastewater treatment processes. PG&E and SoCal Gas Co. provided the electricity and natural gas consumption for each of the water and wastewater facilities. Operational data provided by the Wastewater Treatment Plant Manager was utilized to

determine total methane and nitrous oxide emissions using ICLEI's Wastewater Emissions Data tool. Both of these sources are outlined in **Appendix B**. These totals were entered into the CACP2009 software with the electricity and natural gas coefficients presented in **Appendix C**.

WASTE SECTOR

South County Sanitary reported solid waste tonnage produced by City operations. The City produced 829.6 metric tons of waste in 2005 that was sent to managed landfills. The waste composition was unknown for the city; therefore, the California averages provided by the 2004 California Integrated Waste Management Board Waste Characterization Report were used. A weighted average methane recovery factor of 60% was used in this analysis, as outlined in **Appendix C**.

APPENDIX E:
CITY EMPLOYEE COMMUTE SURVEY, 2009

City Employee Commute Survey, 2009

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1) What is your approximate on-way distance to work (in miles)? Please indicate the most direct distance to work, discounting midway destinations that would be taken whether or not you drove to work each day (i.e. dropping off children at school).

_____

2) Please indicate the type of transportation you take to work each day in your average work week. Please note that there are two types of carpooling.

	Day 1	Day 2	Day 3	Day 4	Day 5
Drive Alone	☐	☐	☐	☐	☐
Carpool with fellow City employees	☐	☐	☐	☐	☐
Carpool with other drivers not employed by the City	☐	☐	☐	☐	☐
Vanpool	☐	☐	☐	☐	☐
Public transit	☐	☐	☐	☐	☐
Motorcycle	☐	☐	☐	☐	☐
Bicycle	☐	☐	☐	☐	☐
Walk	☐	☐	☐	☐	☐
Telecommute	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐

3) What type of vehicle do you drive?

- ☐ Compact/Sub-Compact car (Civic, Corolla, Focus, Neon, Cavalier, Jetta or similar)
- ☐ Mid-size car (Accord, Camry, Passat, Monte Carlo, Sable, Sebring or similar)
- ☐ Full-size car (Impala, Intrepid, Taurus, Crown Victoria, Bonneville, Town Car or similar)
- ☐ Small Truck/SUV/Pickup (RAV4, Chev S10, Pickup (4 cylinder), PT Cruiser or similar)
- ☐ Medium-Small Truck/SUV/Pickup (Minivan, Sonoma Pickup Truck or similar)
- ☐ Medium-Large Truck/SUV/Pickup (Durango, Safari Cargo Van, Ford F150 or similar)
- ☐ Large Truck/SUV/Pickup (Suburban, Expedition, Navigator, Ford E250/350/450 or similar)
- ☐ Motorcycle
- ☐ I don't drive alone or drive a carpool

4) What type of fuel does your vehicle from question 3 use?

- ☐ Gasoline
- ☐ Diesel
- ☐ Biodiesel
- ☐ Hybrid
- ☐ Electric
- ☐ I don't drive to work or drive a carpool
- ☐ Other (Specify): _____

5) If you carpool or vanpool with fellow City employees, home may City employees ride with you? If you carpool with a different number each day, please indicate the average. If 'not applicable', please enter "0".

Enter # of people: _____

APPENDIX B

TECHNICAL APPENDIX

GHG Measure Quantification Details

Several factors including GHG reduction potential as well as economic impacts were key factors in evaluating and selecting GHG emissions reduction measures for Pismo Beach's CAP. This appendix displays pages from the measure evaluation toolbox which detail the methodology, information sources, and assumptions for the GHG reduction potential and cost and savings estimates included in the CAP.

This appendix also contains details regarding the quantification of existing local measures and State reductions which were included in the adjusted forecast as described in Chapter 2 of the CAP.

About the CAP Measure Methods and Calculations

The GHG emission reduction potential of a given measure is quantified following standardized methods for estimating emissions detailed in the California Air Pollution Control Officers Association's (CAPCOA) report Quantifying Greenhouse Gas Mitigation Measures (August 2010). The calculations utilize emissions factors and results from the Pismo Beach' GHG Emissions Inventory, as well as assumptions made by the City about the degree of implementation in the year 2020.

Costs and savings directly associated with the implementation of each measure were estimated for the City, as well as for residents and businesses, where feasible. Cost estimates generally include initial capital costs (e.g., purchase and installation of technology, program development, etc.) needed to produce the emission reductions estimated by the GHG analysis in 2020, and are based on current (2013) prices. Savings include reduced costs associated with electricity, natural gas, and fuel usage, as well as the reduced need for maintenance, and are also based on current (2013) prices. Costs and savings were estimated using information specific to the region—when available—or for similar cities in the region, State of California, or United States, prioritized in that order. There are numerous factors that will affect the actual costs incurred if the measures are implemented. Because of the uncertainties and variability associated with costs and savings, they are reported as ranges in Chapters 3 and 4 of the CAP.

C-1 City Government Energy Efficiency Retrofits and Upgrades

Calculation Methodology and Equations

Note: This measure excludes reductions from street, traffic signal, and public lighting, which is accounted for in Municipal Public Lighting measure.

Key Assumptions for Calculations:

Target percentage of energy savings	10%	Percent
Staff time needed for this measure	0.20	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Municipal Electricity Energy Savings (kWh)=Em x P x 0.95 Municipal Natural Gas Savings (therms)=NGm x P x 0.05		
	Where:		
	Em=	3,097,674	Municipal electricity usage (GHG Emissions Inventory)
	NGm=	5,321	Municipal natural gas usage (GHG Emissions Inventory)
	P=	10%	Target percentage of energy savings (applied 95% electricity, 5% natural gas)
Resource Savings	294,279	Municipal electricity saved (kWh/year)	
	27	Municipal natural gas saved (therms/year)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e)=(Se/1,000 × 0.133)+(Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.20	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	39	MT CO2e	
Municipal Cost and Savings Calculations	Staff time needed to apply for funding and implement the upgrades.		
	FTE =	0.20	Estimated staff time per year to develop new program
	$/FTE=	$70,000	FTE cost
	Cost of staff time =	$14,000	Dollars
	Total Savings = kWh reduced/year x $/kWh + therms reduced/year x $/therm		
	Where:		
	$/kWh =	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	$/Therm =	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
Municipal Cost and Savings	Municipal Cost =	Varies	Dollars (costs will vary based on the level of implementation and financial rebates)
	Municipal Savings =	$55,937	Dollars

Notes

Actual energy and greenhouse gas emissions savings proposed upgrades. A study of building commissioning found whole-building energy savings of 15% at a cost of $0.27 per square foot (LBNL). An estimate of LEED for Existing Buildings found the program reduced energy use by 20% (SPUR).

Implementation Resources: PG&E webpage for local governments - http://www.pge.com/mybusiness/energysavingsrebates/incentivesbyindustry/government/local/

References

1. 2005 California End Use Survey http://www.energy.ca.gov/ceus/
2. Lawrence Berkeley National Laboratory. 2004. Cost-Effectiveness of Commercial-Buildings Commissioning: A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and New Construction in the United States (page 1). www.ga.wa.gov/eas/bcx/Cx_Cost Effectiveness.pdf
3. SPUR - San Francisco Commercial Energy Ordinance http://www.spur.org/publications/library/report/critical_cooling/option4

C-2 City Government Energy Efficient Public Realm Lighting

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of LED street lights installed by 2020	20	Street Lights
Number of LED traffic signals installed by 2020	10	Traffic Signals
Number of LED or CFL other outdoor lights installed by 2020	60	Other Outdoor Lights
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Total electricity saved (kWh) = (N x (Wi-We) x (h/Cf))		
	Where Street Lights:		
	N_{street} =	20	Number of street lights installed lights
	Wi =	200	Average estimated power rating in watts of high pressure sodium street light (Department of Energy [DOE] 2004. National Lighting Inventory and Energy Consumption Estimate)
	We =	50	Average power rating in watts of LED street lighting (DOE and PG&E 2008. LED Street Lighting)
	h =	4,100	Number of hours per year operating
	Cf =	1,000	Conversion factor for W to kW
	Where Traffic Signals:		
	$N_{traffic}$ =	10	Number of traffic installed lights
	Wi =	150	Average estimated power rating in watts of incandescent traffic signal light. (U.S.Department of Energy, 2004 in Stockton Climate Action Plan).
	We =	15	Average power rating in watts of LED traffic signal light (CAPCOA 2010)
	h =	8,760	Number of hours per year operating (24 hours a day)
	Cf =	1,000	Conversion factor for W to kW
	Where Other Private Outdoor Lighting (in Public Realm):		
	N_{other} =	60	Number of other outdoor installed lights
	Wi =	200	Average estimated power rating in watts of public realm lighting (Department of Energy [DOE] 2004. National Lighting Inventory and Energy Consumption Estimate)
	We =	50	Average power rating in watts of LED public realm lighting (DOE 2004)
	h =	3,650	Number of hours per year operating
	Cf =	1,000	Conversion factor for W to kW
Resource Savings	12,300	Electricity saved from LED street lights (kWh)	
	11,826	Electricity saved from LED traffic signals (kWh)	
	32,850	Electricity saved from LED "other" public realm lighting (kWh)	
	56,976	Total electricity saved (kWh)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e)=(Se/1,000 × 0.133)		
	Where:		
	Se=	electricity savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
GHG Emission Reduction	8	MT CO2e/year	
	Total energy savings = kWh reduced/year * $/kWh		
	Where:		
	$/kWh =	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total annual energy cost savings=	$10,825	Dollars per year
	Maintenance savings per fixture =	$17	Annual maintenance savings/fixture (Palo Alto)
	Some staff time may be needed to implement the program.		
	FTE =	0.1	Estimated staff time per year to develop new program

Municipal Costs and Savings Calculations	$/FTE=	$70,000	FTE cost
	Cost of staff time =	$7,000	Dollars
	Total Capital Cost = [Number of units installed x cost per unit] – [Available rebates]		
	Where Streetlights:		
	Number of units installed =	20	Units
	Cost per unit installed =	$350	Dollars/unit (Energy Solutions 2008; PNNL 2010)
	Total cost=	$7,000	Dollars
	Available rebates =	$125	Dollars/unit ($125 for 200 watt unit replaced - PG&E)
	Net cost =	$4,500	Dollars (total cost - available rebates)
	Where Traffic Signals:		
	Number of units installed =	10	Units
	Cost per unit installed =	$193	Dollars/unit (assuming a standard three 12” (red, yellow, and green) balls per signal (Western Pacific Signal 2011; eLightBulbs 2011))
	Cost installation =	$1,930	Dollars
	Available rebates =	$100	Dollars ($100 for 150 watt unit replaced - PG&E)
	Net cost =	$930	Dollars (total cost - available rebates)
	Where Other Private Outdoor Lighting (in Public Realm):		
	Number of units installed =	60	Units
	Cost per unit installed =	$300	Dollars/unit (Energy Solutions 2008; PNNL 2010)
	Cost installation =	$18,000	Dollars
	Available rebates =	$100	Dollars ($100 for 150 watt unit replaced - PG&E)
	Net cost =	$12,000	Dollars (total cost - available rebates)
Municipal Costs and Savings	Municipal Cost =	$24,430	Dollars
	Municipal Savings =	$11,235	Dollars

Notes

Lamp wattage varies. Stationary source outdoor lights range from 83W to 407 W (DOE, page 48). LED lamps are typically under 100 W (DOE and PG&E).

References

1. PG&E Streetlight program - http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/streetlightprogram.shtml
2. DOE National Lighting Inventory and Energy Consumption Estimate http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/lmc_vol1_final.pdf
3. DOE and PG&E LED Street Lighting study - http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_sf-streetlighting.pdf
4. PG&E LED Streetlight Rebates - http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/incentives/index.shtml
5. Western Pacific Signal 2011; eLightBulbs 2011; Energy Solutions 2008; PNNL 2010 from Stockton Draft CAP - http://www.stocktongov.com/files/ClimateActionPlanDraftFeb2012.pdf
6. Palo Alto - Demonstration Assessment of Light-Emitting Diode (LED) Roadway Lighting on Residential and Commercial Streets - http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_palo-alto.pdf

C-3 Energy Efficiency Requirements for New City-owned Buildings

Calculation Methodology and Equations

Key Assumptions for Calculations:

New municipal building square feet by 2020	25,000	Square Feet
Target percentage of energy savings above State standards	30%	Percent
Staff time needed for this measure	0.08	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Municipal Electricity Energy Savings (kWh)=E × Eec × (1 - CSP) × 12.95 × Msf Municipal Natural Gas Savings (therms)=E × Egc × (1 - CSP) × 0.29 × Msf		
	Where:		
	Msf=	25,000	New municipal building square feet by 2020
	E=	30%	Target percentage of energy savings
	Eec=	64%	Percent of commercial electricity use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 9)
	Egc=	70%	Percent of commercial natural gas use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 9)
	CSP=	30%	Percent non-residential energy savings above current State standards (CEC 2013 Building Efficiency Standards, slide 17)
	Municipal electricity use intensity=	12.954999	kWh/square foot/year (Average electric use intensity for commercial buildings in kWh/square feet/year (California Energy Commission [CEC] 2005 California End Use Survey [CEUS], page 8))
	Municipal natural gas use intensity=	0.34999	therms/square foot/year (Average natural gas usage intensity for commercial buildings in therms/square feet/year (CEC 2005 CEUS, page 8))
Resource Savings	43,529	Municipal kWh/year saved	
	1,286	Municipal therms/year saved	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.20	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	13	MT CO2e	
Municipal Costs and Savings	Staff time developing policy Municipal cost savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	FTE =	0.08	Estimated staff time per year to develop new program

Municipal Costs and Savings Calculations	$/FTE=	$70,000	FTE cost
	Total cost off staff time =	$5,600	Dollars
	Cost of implementation =	$1.25	Average cost to implement (sq ft) - Projected PG&E Zone 5 Costs (CA Department of Energy)
	Total implementation cost =	$31,250	Dollars
Municipal Cost and Savings	Municipal Cost =	$36,850	Dollars
	Municipal Savings =	$9,138	Dollars

Notes

Title 24 covers only 64% of commercial electricity use and 70% of natural gas use (SEEC, page 7). 2013 Title 24 updates are expected to reduce non-residential energy use by 30% (CEC).

References

1. 2005 California End Use Survey http://www.energy.ca.gov/ceus/
2. CEC 2013 Building Efficiency Standards, slide 17 - http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-05-31_2013_standards_adoption_hearing_presentation.pdf
3. SEEC 2011 Greenhouse Gas Forecasting Assistant, page 7 - http://californiaseec.org/documents/forecasting-tools/seec-forecast-assistant-documentation
4. http://www.energy.ca.gov/title24/2008standards/ordinances/san_luis_obispo/CZ5_Cost-Effectiveness_Report-Final.pdf

C-4 Renewable Energy Systems on City Property

Calculation Methodology and Equations

Key Assumptions for Calculations:

kW of municipal solar PV installations by 2020	25	kW
Number of solar hot water heaters	1	Systems
Staff time needed for this measure	0.10	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Municipal Electricity Energy Savings (kWh)=(kW × 1,900) + (Msw × Ee)		
	Where:		
	Msi=	25	kW of solar installations by 2020
	Msw=	0.1	# of solar electric water heater installations by 2020
	Mswg=	0.9	# of solar natural gas water heater installations by 2020
	Ee=	2,945	average expected municipal solar water heater savings in kWh per year (California Solar Initiative (CSI 2) Thermal Program Cal Solar statistics)
	Eg=	139	average expected municipal solar water heater savings in therms per year (CSI 2 - 2012 Thermal Program Cal Solar statistics)
	Conversion factor=	1,900	conversion factor from kW to kWh per year (Solar Energy Industries Association [SEIA] Solar Radiation Conversion Map)
Resource Savings	125	Municipal natural gas saved (therms/year)	
	47,795	Municipal electricity saved (kWh/year)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.20	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reductions	7	MT CO2e	
Municipal Costs and Savings Calculations	Municipal cost savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Staff time to obtain grant funding and implement project		
	FTE =	0.1	Estimated staff time to develop new program
	$/FTE	$70,000	Dollars per year
	Total Staff Cost=	$7,000	Dollars per year
	Total Capital Cost = Total Cost of Solar Units (bulk purchase + installation) + Total Staff Cost - Available Rebates		

Calculations	Where:		
	Commercial solar installation cost =	$4.38	Commercial Solar Installations per watt (Green Tech Media)
	Total solar PV installation cost =	$208,050	Average capital cost per kW (CSI statistics)
	Solar water heater cost =	$4,650	Dollars (Incremental installed cost of solar hot water heater (National Renewable Energy Lab, August 2012))
	Available rebates =	$2,175	Dollars (available Rebate for replacing natural gas heater with solar (Go Solar CA))
	Cost of solar hot water heater with rebate =	$2,475	Dollars (cost of solar hot water heater installation minus rebate)
	Total cost of solar water heaters =	$2,475	Dollars
Municipal Costs and Savings	Municipal Cost =	$217,525	Dollars
	Municipal Savings =	$8,991	Dollars

Notes

Municipal installation size assumptions are the averages for PV installations in California. The installation size uses the CSI rating, which accounts for a design factor, and is a more accurate reflection of energy generated by the installation. Municipal solar water heater savings is an average of the expected savings for all the projects that have applied for the CSI-Thermal rebate in California (Cal Solar).

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measures 3r and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

The model assumes that solar water heaters are installed in combination with both electric and natural gas water heaters. The model assumes that 90% of the systems installed offset natural gas water heaters; 10% offset electric water heaters.

References

1. California Solar Initiative (CSI) - http://www.californiasolarstatistics.ca.gov/
2. California Solar Initiative CSI-Thermal Program - http://www.gosolarcalifornia.ca.gov/solarwater/index.php
3. CEC Planning and Permitting Resources For Renewable Energy Systems -http://www.energy.ca.gov/localgovernment/planning_resources/
4. SEIA Solar Radiation Conversion Map - http://www.getsolar.com/blog/what-can-one-kilowatt-of-solar-do-for-you/13483/
5. http://www.greentechmedia.com/research/ussmi
6. National Renewable Energy Lab, August 2012 - http://www.nrel.gov/solar/
7. Go Solar CA - http://www.gosolarcalifornia.ca.gov/

E-1 Energy Efficiency Outreach and Incentive Programs

Calculation Methodology and Equations

Note: This measure should use conservative assumptions to avoid double counting with other energy measures.

Key Assumptions for Calculations:

Percent of households participating by 2020	40%	Percent
Percent of businesses participating by 2020	35%	Percent
Targeted percent residential energy savings	5%	Percent
Targeted percent commercial energy savings	6%	Percent
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Electricity Savings (kWh) = Rp × Rs x 95% x Re Residential Natural Gas Savings (therms) = Rp × Rs x 5% x Rn Commercial Electricity Savings (kWh) = Cp x Cs x 95%x Ce Commercial Natural Gas Savings (kWh) = Cp x Cs x 5% x Cn		
	Where:		
	Rp=	40%	Percent of residences participating in rebate and programs by 2020
	Cp=	35%	Percent of businesses participating in rebate and incentive programs by 2020
	Rs=	5%	Percent residential energy savings (applied 95% electricity, 5% natural gas)
	Cs=	6%	Percent commercial energy savings (applied 95% electricity, 5% natural gas)
	Re=	22,107,232	2020 residential electricity usage (kWh)
	Rn=	1,640,635	2020 residential natural gas usage (therms)
	Ce=	43,819,549	2020 commercial electricity use (kWh)
	Cn=	1,606,203	2020 commercial natural gas usage (therms)
Resource Savings	420,037	Residential electricity saved (kWh)	
	1,641	Residential natural gas saved (therms)	
	874,200	Commercial electricity saved (kWh)	
	1,687	Commercial natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	Residential or commercial electricity savings	
	Sg=	Residential or commercial natural gas savings	
	1,000	= Conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= Conversion factor for therm to MMBtu	
	0.133	= Average projected emissions factor for electricity in 2020 in MT CO_2e/MWh	
	53.20	= Average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	65	Residential Reduction (MT CO2e)	
	125	Commercial Reduction (MT CO2e)	
	190	Total Reduction (MT CO2e) in 2020	
Municipal Costs and Savings Calculations	Staff time to participate in and promote existing programs.		
	FTE =	0.05	Estimated staff time per year
	$/FTE=	$70,000	FTE cost per year
Municipal Costs and Savings	Municipal Cost =	$3,500	Dollars
	Municipal Savings =	$0	Dollars

Community Costs and Savings Calculations	Total savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total residential savings=	$81,316	Dollars per year
	Total commercial savings=	$163,967	Dollars per year
	Households =	5,768	Total number of households projected in 2020
	Households participating =	2,307	Households participating by 2020
	Commercial units =	1,252	Total number of projected commercial units in 2020
	Commercial units participating =	438	Commercial units participating by 2020
Community Cost and Savings	Residential Cost =	Varies	Dollars per household
	Commercial Cost =	Varies	Dollars per business
	Residential Savings =	$35	Dollars per household
	Commercial Savings =	$374	Dollars per business

Notes

Assumes that of the total percent reduction in energy use, 95% applies to electricity and 5% applies to natural gas.

References

1. Pacific Gas and Electricity Company. 2012. Energy Overview Tableau Reports.
2. Rincon Consultants. November 2012. Cities Greenhouse Gas Emissions Inventories.
3. California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast

E-2 Energy Audit and Retrofit Program

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of households audited by 2020	600	Units
Number of businesses audited by 2020	350	Units
Target percentage of energy savings	30%	Percent
Staff time needed for this measure	0.10	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Square Feet (Rsf) = Ru × 1,545 Residential Electricity Energy Savings (kWh)=E × 0.40 × Rsf × 3.5 Residential Natural Gas Savings (therms)=E × 0.40 × Rsf × 0.3		
	Ru=	600	# residential units audited by 2020
	Average residential unit size=	1,545	Square feet/dwelling unit (California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS])
	Audit to retrofit conversion rate=	40%	Percentage of units that receive an audit that complete energy efficiency installation (Energy Savvy)
	Rsf=	370,800	# square feet of residential space retrofitted by 2020
	E=	30%	Target percentage of energy savings
	Residential electricity use intensity=	3.5	kWh/square foot/year (Average electric use intensity for residential buildings in kWh/square foot/year [RASS]).
	Residential natural gas use intensity=	0.3	Therms/square foot/year (Average natural gas usage intensity for residential buildings in therms/square foot/year [RASS]).
	Commercial Square Feet (Csf) = Cu × 4,500 Commercial Electricity Energy Savings (kWh)=E × 0.40 × Csf × 12.95 Commercial Natural Gas Savings (therms)=E × 0.40 × Csf × 0.3		
	Where:		
	Cu=	350	# of commercial units or buildings audited by 2020
	Average commercial unit size=	4,500	Average commercial unit/business size in square feet
	Audit to retrofit conversion rate=	40%	Percentage of units that receive an audit that complete energy efficiency installation (Energy Savvy)
	Csf=	630,000	Square feet of commercial space upgraded by 2020
	E=	30%	Target percentage of energy savings
	Commercial electricity use intensity=	12.95	kWh/square foot/year (Average electric use intensity for commercial buildings in kWh/square feet/year (California Energy Commission [CEC] 2005 California End Use Survey [CEUS], page 184)).
	Commercial natural gas use intensity=	0.3	therms/square foot/year (Average natural gas usage intensity for commercial buildings in therms/square feet/year (CEC 2005 CEUS, page 184)).
Resource Savings	394,891	Residential electricity saved (kWh)	
	38,923	Residential natural gas saved (therms)	
	2,448,495	Commercial electricity saved (kWh)	
	66,148	Commercial natural gas saved (therms)	
	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.20/1,000)		

GHG Emission Reduction Calculations	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected 2020 electricity emissions factor (MT CO2e/MWh)	
	53.20	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	260	Residential Reduction (MT CO2e) in 2020	
	678	Commercial Reduction (MT CO2e) in 2020	
Municipal Cost and Savings Calculations	Staff time developing and administering program.		
	FTE =	0.10	Staff time needed for this measure
	$/FTE=	$70,000	Cost associated with staff time
Municipal Cost and Savings	Municipal Cost=	$7,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Total savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	$110,838	Residential Savings ($/year)	
	$509,000	Commercial Savings ($/year)	
	Total Cost of residential retrofit =	$3,000	Cost per home (average ACEEE)
	Available residential rebates =	$3,000	Energy Upgrade California offers rebates ranging from $2,000-$4,000 ($2,500 rebate for 25% energy savings).
	Total cost of commercial retrofit =	$4,545	Cost per commercial unit ($1.01 per square foot - AECOM 2010; Gregerson 1997)
	Available commercial rebates =	$2,273	PG&E offers $0.09/kWh (PG&E Customized Retrofit Incentives) and SCE offers $1.00/therm (SCE Financial Incentives for Energy Efficiency) for retrofit projects, with the total incentive capped at 50% of the measure cost
Community Costs and Savings	Residential Cost =	$0	Dollars per household
	Commercial Cost =	$2,273	Dollars per business
	Residential Savings =	$185	Dollars per household
	Commercial Savings =	$1,454	Dollars per business

Notes

This is based on average energy consumption. Programs that emphasize audits and retrofits to buildings constructed prior to Title 24 (1980), will see greater reductions.

Audit to retrofit conversion rates and energy savings vary significantly by program. In a study of 16 audit programs around the country, audit to retrofit conversion rates ranged from 30% to 50% (Energy Savvy). In a study of 7 residential audit programs between 2000 and 2004 in California, expected savings ranged from 50 kWh per audit to 800 kWh per audit (NEEBPG). This represents between 1% and 15% of energy use (NEEBPG).

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measures 3a and 3d, and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

References

1. Energy Savvy - Energy Audit Programs That Work http://www.energysavvy.com/blog/2010/09/14/energy-audit-programs-that-work/
2. NEEBPG - Residential Audit Programs Best Practices Report http://www.eebestpractices.com/pdf/BP_R7.PDF
3. California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS] - http://www.energy.ca.gov/appliances/rass/
4. PG&E Energy House Calls - http://www.energyhousecalls.com/?WT.mc_id=GSEHC154&WT.srch=1&gclid=CJ6xi8_jmLMCFQSqnQodsAEAiA
5. Energy Upgrade California - http://www.pge.com/myhome/saveenergymoney/energysavingprograms/euca.shtml
6. Energy Information Administration, 1995 Commercial Buildings Energy Consumption Survey - http://www.eia.gov/emeu/consumptionbriefs/cbecs/pbawebsite/retailserv/retserv_howlarge.htm
7. CONSOL. August 2008. Meeting AB 32 -- Cost-Effective Green House Gas Reductions in the Residential Sector, available at: http://www.cbia.org/go/cbia/?LinkServID=D3BFD657-F8E2-4F63-97B404B55FD856B5&showMeta=0
8. PG&E Third Party Screen and Certification of Home Improvement Contractors - http://www.egia.org/Academy/rockymountainexchange2011/docs/JaneKruse.pdf
9. PG&E Customized Retrofit Incentives - http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ief/
10. SCE Financial Incentives for Energy Efficiency - http://www.socalgas.com/documents/business/EECIPFactSheet.pdf
11. U.S. Department of Energy (DOE). 2011a. Home Energy Saver. Available: <http://hes.lbl.gov/consumer>. Accessed: July 6, 2011.
12. American Council for an Energy-Efficient Economy (ACEEE), Berkeley RECO Case Study - http://aceee.org/sector/local-policy/case-studies/berkeley-california-residential-energ

E-3 Income-Qualified Energy Efficient Weatherization Programs

Calculation Methodology and Equations

Key Assumptions for Calculations:

Residential units upgraded by 2020	50	Units
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Square Feet (Rsf) = Ru × 1,545 Residential Electricity Energy Savings (kWh)=E × Rsf × 3.5 Residential Natural Gas Savings (therms)=E × Rsf × 0.3		
	Ru=	50	Residential units upgraded by 2020
	Average residential unit size=	1,545	Square feet/dwelling unit California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS])
	Rsf=	77,250	Square feet of residential space upgraded by 2020
	E=	35%	Average first-year weatherization energy savings (Oak Ridge National Laboratory (ORNL) 2010 Weatherization Assistance Program Technical Memorandum: Background Data and Statistics. Page 5.)
	Residential electricity use intensity=	3.5499	kWh/square foot/year (Average electric use intensity for residential buildings in kWh/square foot/year [RASS]).
	Residential natural gas use intensity=	0.3	Therms/square foot/year (Average natural gas usage intensity for residential buildings in therms/square foot/year [RASS]).
Resource Savings	95,980	Residential electricity saved (kWh)	
	9,460	Residential natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e)=(Se/1,000 × 0.133)+(Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.20	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	63	MT CO2e	
Municipal Costs and Savings Calculations	Staff time coordinating with CAPSLO and local utilities, and conducting outreach.		
	FTE =	0.05	Staff time needed for this measures
	$/FTE=	$70,000	Dollars per year
Municipal Costs and Savings	Municipal Cost=	$3,500	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Residential cost savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total Community Savings =	$26,940	Residential Savings
Community Cost and Savings	Community Cost =	$0	Dollars per household

Community Cost and Savings	Community Savings =	$539	Dollars per household

Notes

The first-year energy savings for LIHEAP households is approximately 34.5% or $437 (ORNL). The average energy savings per low-income housing unit for Weatherization Assistance is estimated by the State of California Department of Community Services and Development (CSD) to be $418 per year.

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measures 3a and 3d, and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

PG&E and SoCalGas contract with CAPSLO to provide weatherization services to the region as part of the statewide Energy Savings Assistance Program (ESAP). http://www.cpuc.ca.gov/PUC/energy/Low+Income/liee.htm

For low-income households: no-cost weatherization under Energy Savings Assistance Program. For middle-income households: free weatherization under PG&E's Middle Income Direct Install program.

References

1. CSD - Helps Low-Income Families Manage and Reduce Energy Costs http://www.csd.ca.gov/Contractors/documents/Energy%20tab/LIHEAP-DOE%20Fact%20Sheet%20%282008%29.pdf
2. California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS] - http://www.energy.ca.gov/appliances/rass/
3. ORNL 2010 Weatherization Assistance Program Technical Memorandum: Background Data and Statistics (page 5) - http://weatherization.ornl.gov/pdfs/ORNL_TM-2010-66.pdf
4. California Energy Commission (CEC) 2005 California End Use Survey - http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF
5. California Flex Your Power - http://www.fypower.org/feature/lowincome/
6. PG&E Direct Install -http://www.staplesenergy.com/residential-case-studies/pge-middle-income-direct-install-program

E-4 Incentives for Exceeding Title 24 Building Energy Efficiency Standards

Calculation Methodology and Equations

Key Assumptions for Calculations:

New or remodeled residences exceeding State standards	50	Units
New non-residential buildings exceeding State standards	25	Units
Target percentage of energy savings above State standards	30%	Percent
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Square Feet (Rsf) = Ru × 1,545 Residential Electricity Energy Savings (kWh) = E × Eec × Rsf × (1 - CSP) × 3.5 Residential Natural Gas Savings (therms) = E × Egc × Rsf × (1 - CSP) × 0.3		
	Ru=	50	# of new residential units exceeding State standards by 2020
	Average residential unit size=	1,545	Square feet/dwelling unit (California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey (RASS))
	Rsf=	77,250	# square feet of residential space that exceed State standards by 2020
	E=	30%	Target percentage of energy savings above State standards
	Eec=	32.8%	Percent of single family electricity use covered by Title 24 (Statewide Energy Efficiency Collaborative [SEEC] 2011 Greenhouse Gas Forecasting Assistant, page 7)
	Egc=	85.7%	Percent of single family natural gas use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 7)
	CSP=	25%	Percent single family residential energy savings above current State standards (CEC 2013 Building Efficiency Standards, slide 11)
	Residential electricity use intensity=	3.5	kWh/square foot/year (Average electric use intensity for residential buildings in kWh/square foot/year [RASS]).
	Residential natural gas use intensity=	0.3	Therms/square foot/year (Average natural gas usage intensity for residential buildings in therms/square foot/year [RASS]).
	Commercial Electricity Energy Savings (kWh)= E × Egc × (1 - CSP) × 12.95 × Csf Commercial Natural Gas Savings (therms)=E × Egc × (1 - CSP) × 0.3 × Csf		
	Where:		
	Cu=	25	# of commercial units or buildings audited by 2020
	Average commercial unit size=	4,500	Average square feet for all commercial buildings (Energy Information Administration)
	Csf=	112,500	# of new square feet of commercial space that exceeds State standards by 2020
	E=	30%	Target percentage of energy savings above State standards
	Eec=	64%	Percent of commercial electricity use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 9)
	Egc=	70%	Percent of commercial natural gas use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 9)

	CSP=	30%	Percent non-residential energy savings above current State standards (CEC 2013 Building Efficiency Standards, slide 17)
	Commercial electricity use intensity=	12.954999	kWh/square foot/year (Average electric use intensity for commercial buildings in kWh/square feet/year (California Energy Commission [CEC] 2005 California End Use Survey [CEUS]))
	Commercial natural gas use intensity=	0.34999	therms/square foot/year (Average natural gas usage intensity for commercial buildings in therms/square feet/year (CEC 2005 CEUS))
Resource Savings	20,238	Residential electricity saved (kWh)	
	5,212	Residential natural gas saved (therms)	
	195,880	Commercial electricity saved (kWh)	
	5,788	Commercial natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.13	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.20	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	30	Residential Reduction (MT CO2e/year)	
	57	Commercial Reduction (MT CO2e/year)	
Municipal Costs and Savings Calculations	Staff time developing new materials, identifying and adopting incentives.		
	FTE =	0.05	Estimated staff time per year to develop new program
	$/FTE=	$70,000	FTE cost
Municipal Costs and Savings	Municipal Cost=	$3,500	Dollars per year
	Municipal Savings =	$0	Dollars per year
Community Costs and Savings Calculations	Total savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total residential savings =	$8,640	Residential Savings ($/year)
	Total commercial savings =	$41,122	Commercial Savings ($/year)
	Average residential Cost =	$0.91	Residential average cost to implement (sqft) - Projected PG&E Zone 5 Costs (US Department of Energy)
	Average commercial Cost =	$1.25	Commercial average cost to implement (sq ft) - Projected PG&E Zone 5 Costs (CA Department of Energy)
	Residential Cost =	$1,406	Dollars per household

Community Costs and Savings	Commercial Cost =	$5,625	Dollars per business
	Residential Savings =	$173	Dollars per household
	Commercial Savings =	$1,645	Dollars per business

Notes

Title 24 covers only 64% of commercial electricity use and 70% of natural gas use (SEEC, page 7). 2013 Title 24 updates are expected to reduce non-residential energy use by 30% (CEC).

Title 24 covers only 32.8% of single family residential electricity use and 85.7% of natural gas use (SEEC, page 7). 2013 Title 24 updates are expected to reduce single family residential energy use by 25% and multifamily residential by 14% (CEC).

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measure 3k and 3l, and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

References

1. 2005 California End Use Survey http://www.energy.ca.gov/ceus/
2. CEC 2013 Building Efficiency Standards, slide 17 - http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-05-31_2013_standards_adoption_hearing_presentation.pdf
3. SEEC 2011 Greenhouse Gas Forecasting Assistant, page 7 - http://californiaseec.org/documents/forecasting-tools/seec-forecast-assistant-documentation
4. http://www.energy.ca.gov/title24/2008standards/ordinances/san_luis_obispo/CZ5_Cost-Effectiveness_Report-Final.pdf

E-5 Small Solar Photovoltaic (PV) Incentive Program

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of commercial solar PV installations (between 2013-2020)	50	Systems
Number of residential solar PV installations (between 2013-2020)	275	Systems
Number of residential solar water heaters installed by 2020*	80	Systems
Staff time needed for this measure	0.02	Full Time Equivalent (FTE)

*Approximately 0.013 installations per household as a result of the Solar Water Heating program established under Assembly Bill 1470, the Solar Thermal Heating Act of 2007.

Calculations:

Resource Savings Calculations	Commercial Electricity Energy Savings (kWh)= Csi × Acsi × 1,900 Residential Electricity Energy Savings (kWh)= (Rsi × Arsi × 1,900) + (Rsw × Ee) Residential Natural Gas Energy Savings (therms) = Rswg × Eg		
	Where:		
	Csi =	50	# of commercial solar installations by 2020
	Rsi =	275	# of residential solar installations by 2020
	Rsw =	8	# of residential solar electric water heater installations by 2020 (assumes 10% electric)
	Rswg =	72	# of residential solar natural gas water heater installations by 2020 (assumes 90% natural gas)
	Acsi =	33.8	average commercial solar installation size in kW (Cal Solar Initiative [CSI 1])
	Arsi =	4.6	average residential solar installation size in kW (CSI 1)
	Ee =	2,945	average expected residential solar water heater savings in kWh per year (California Solar Initiative (CSI 2) Thermal Program Cal Solar statistics)
	Eg =	139	average expected residential solar water heater savings in therms per year (CSI 2 - 2012 Thermal Program Cal Solar statistics)
	Conversion factor =	1,900	conversion factor from kW to kWh per year (Solar Energy Industries Association [SEIA] Solar Radiation Conversion Map)
Resource Savings	2,427,060	Residential electricity saved (kWh)	
	10,008	Residential natural gas saved (therms)	
	3,211,000	Commercial electricity saved (kWh)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.20	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	803	MT CO2e	
Municipal Costs and Savings Calculations	Staff time developing new materials and performing marketing and outreach activities.		
	FTE =	0.02	Estimated staff time per year to develop new program
	$/FTE	$70,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$1,400	Dollars per year
	Municipal Savings =	$0	Dollars per year
	Commercial cost savings = [Electricity Savings x $/kWh] Residential cost savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast

Community Costs and Savings Calculations	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total residential savings =	$470,349	Dollars
	Total commercial savings =	$597,246	Dollars
	Commercial solar installed cost =	$4.38	Commercial Solar Installations per watt (Green Tech Media)
	Residential solar installed cost =	$5.46	Residential Solar Installations per watt (Green Tech Media)
	Total cost of installed commercial solar =	$7,402,200	Dollars
	Total cost of installed residential solar =	$6,906,900	Dollars
	Residential solar water heater cost =	$4,650	Dollars (Incremental installed cost of solar hot water heater (National Renewable Energy Lab, August 2012))
	Available rebates =	$2,175	Dollars (available Rebate for replacing natural gas heater with solar (Go Solar CA))
	Cost of solar hot water heater with rebate =	$2,475	Dollars (cost of solar hot water heater installation minus rebate)
	Total cost of solar water heaters =	$198,000	Dollars
Community Cost and Savings	Residential Cost =	$20,014	Dollars per household
	Commercial Cost =	$148,044	Dollars per business
	Residential Savings =	$1,325	Dollars per household
	Commercial Savings =	$11,945	Dollars per business

Notes

Commercial and residential installation size assumptions are the averages for San Luis Obispo County PV installations for completed and PBI projects (Cal Solar). The installation size uses the CSI rating, which accounts for a design factor, and is a more accurate reflection of energy generated by the installation. Solar water heater savings is an average of the expected savings for all the projects that have applied for the CSI-Thermal rebate in San Luis Obispo County (CSI 2).

When combining energy measures, the City should be aware of double-counting emission reductions. Should not double count with Measure 3k, Low Income Solar Program, and Measure 3q, Municipal Solar Installations.
The model assumes that solar water heaters are installed in combination with both electric and natural gas water heaters. The model assumes that 90% of the systems installed offset natural gas water heaters; 10% offset electric water heaters.
Installed cost of conventional natural gas system is $1,350 and installed cost of residential solar water heaters: $6,000 (National Renewable Energy Lab).

References

1. Cal Solar - http://www.californiasolarstatistics.ca.gov/
2. California Solar Initiative CSI-Thermal Program - http://www.gosolarcalifornia.ca.gov/solarwater/index.php
3. CEC Planning and Permitting Resources For Renewable Energy Systems - http://www.energy.ca.gov/localgovernment/planning_resources/
4. SEIA Solar Radiation Conversion Map - http://www.getsolar.com/blog/what-can-one-kilowatt-of-solar-do-for-you/13483/
5. http://www.nrel.gov/docs/fy11osti/48986.pdf
6. http://www.greentechmedia.com/research/ussmi
7. National Renewable Energy Lab, August 2012 - http://www.nrel.gov/solar/

E-6 -Qualified Solar PV Program

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of low-income residential solar PV installations by 2020	30	Systems
Number of low-income residential solar water heaters installed by 2020	20	Systems
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Electricity Energy Savings (kWh)= (Rsi × Arsi × 1,900) + (Rsw × Ee) Residential Natural Gas Energy Savings (therms) = Rswg × Eg		
	Rsi=	30	# of low-income residential solar PV installations
	Rsw=	2	# of low-income residential solar electric water heater installations by 2020 (assumes 10% electric)
	Rswg=	18	# of residential solar natural gas water heater installations by 2020 (assumes 90% natural gas)
	Arsi=	4.6	average residential solar installation size in kW (Cal Solar Initiative [CSI 1])
	Ee=	2,945	average expected residential solar water heater savings in kWh per year (California Solar Initiative (CSI 2) Thermal Program Cal Solar statistics)
	Eg=	139	average expected residential solar water heater savings in therms per year (CSI 2 - 2012 Thermal Program Cal Solar statistics)
	Conversion factor=	1,900	conversion factor from kW to kWh per year (Solar Energy Industries Association [SEIA] Solar Radiation Conversion Map)
Resource Savings	268,090	Residential electricity saved (kWh)	
	2,502	Residential natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.13	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.20	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reductions	49	MT CO2e	
Municipal Costs and Savings Calculations	Staff time for collaboration and outreach.		
	FTE =	0.05	Estimated staff time per year to develop new program
	$/FTE=	$70,000	Dollars per year
Municipal Costs and Savings	Municipal Cost=	$3,500	Dollars per year
	Municipal Savings =	$0	Dollars per year
Community Costs and Savings Calculations	Residential savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast

	Total residential savings =	$53,239	Dollars
Community Costs and Savings	Community Cost =	$0	Dollars per household (Assumes to be paid for through programs.)
	Community Savings =	$1,065	Dollars per household

Notes

Residential installation size assumptions are the averages for San Luis Obispo County PV installations for completed projects (Cal Solar 1). The installation size uses the CSI rating, which accounts for a design factor, and is a more accurate reflection of energy generated by the installation. Solar water heater savings is an average of the expected savings for all the projects that have applied for the CSI-Thermal rebate in San Luis Obispo County (Cal Solar 2).

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measures 3q, and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

The model assumes that solar water heaters are installed in combination with both electric and natural gas water heaters. The model assumes that 90% of the systems installed offset natural gas water heaters; 10% offset electric water heaters.

References

1. California Solar Initiative (CSI) - http://www.californiasolarstatistics.ca.gov/
2. California Solar Initiative CSI-Thermal Program - http://www.gosolarcalifornia.ca.gov/solarwater/index.php
3. CEC Planning and Permitting Resources For Renewable Energy Systems - http://www.energy.ca.gov/localgovernment/planning_resources/
4. SEIA Solar Radiation Conversion Map - http://www.getsolar.com/blog/what-can-one-kilowatt-of-solar-do-for-you/13483/

TL-1 Bicycle Network

Calculation Methodology and Equations

Key Assumptions for Calculations:

Miles of new bike lane by 2020	5	Miles
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = (A*B)+(A*D)		
	City Area =	3.6	Square Miles
	Forecast VMT (2020) =	172,963,018	VMT in 2020
	Decrease in VMT (B) =	1.0%	Estimated VMT reduction factor for incorporating bike lanes into street design (CAPCOA) (Assumes 1% decrease in VMT per mile of new bike lane per square mile area. Maximum reduction capped at 1% to avoid double counting from alternative travel related VMT reductions.)
	VMT reduction for installing bicycle racks (D)=	0.06%	Percent - (CAPCOA, SDT-6)
Resource Savings	Total VMT Reduction =	1,838,597	VMT per year
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	687	MT CO2e
Municipal Costs and Savings Calculations	Staff time required for developing policies and acquiring grant funding for bicycle infrastructure. There would be minimal additional costs associated with staff time needed for plan checks; however, this cost will be absorbed through development/permitting fees.		
	FTE =	0.05	Estimated staff time per year to develop new program
	$/FTE=	70,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$3,500	Dollars (Assumes that grant funding would be used to implement bicycle infrastructure. Minimal costs would occur as a result of incorporating multi-modal improvements into pavement resurfacing, restriping, and signalization operations (less than $5,000).)
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Community VMT Reduced=	1,838,597	Dollars per year
	Community operating cost per mile =	$0.56	Dollars
	Average round trip length =	17.82	Miles (Fehr & Peers)
	Round trips switching from driving to biking =	103,176	Round trips
	Cost per mile of new bicycle lane =	$40,000	Dollars per mile (Assumes $40,000 per mile average. Actual cost would depend on the type of bicycle lane being installed - see notes below)
	Total cost of new bicycle lanes =	$200,000	Dollars

	Cost of bicycle parking =	$0	Dollar (Bicycle parking standards for non-residential development went into effect January 1, 2001 as part of California Green Building Standards Code, and are therefore now a cost associated with doing business-as-usual)
Community Costs and Savings	Community Cost =	$0	Dollars per person (Assumes cost of bike lanes would be incurred by the City through grant funding and private developers.)
	Community Savings =	$10	Dollars per trip (Savings varies depending on how many bicycle trips are made by a single person.)

Notes

Calculation methodology derived from CAPCOA measures SDT-5 and SDT-6

The following is provided for informational purposes:
Cost of infrastructure development is highly variable. Cost estimates for bicycle infrastructure: Class I Bike Path - approximately $1,000,000 per mile; Class II Bike Lanes - $10,000 - $1,000,000 per mile (depending on level of roadway improvement required); Class III Bike Routes - $2,000 - $60,000 per mile (depending on the level of treatment; route signage only would be lower end, signage and shoulder striping, pavement markings, signal actuation would be higher end). The cost per mile of sidewalk is approximately $250,000.

References and Links

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf
2. Cambridge Systematics. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions (2009). http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendices_Complete_102209.pdf
3. Sacramento Metropolitan Air Quality Management District (SMAQMD) Recommended Guidance for Land Use Emission Reductions. (p.13) http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf
4. US Department of Transportation, http://www.nhtsa.gov/people/injury/pedbimot/bike/Safe-Routes-2002/safe.html#8
5. SLO COG RTP - http://www.slocog.org/cm/Programs_and_Projects/2010_Regional_Transportation_Plan.html

TL-2 Pedestrian Network

Calculation Methodology and Equations

Key Assumptions for Calculations:

Miles of new sidewalk added by 2020	5	Miles
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = Forecast VMT x A x B		
	Forecast VMT (2020) =	172,963,018	VMT
	Percent VMT reduction from pedestrian network improvements (A) =	0.5%	Percent reduction in VMT (CAPCOA SDT-1)
	Traffic Calming Selected?	Yes	Traffic Calming Selected (Yes or No from cell G17)
	Percent VMT reduction from traffic calming improvements (B) =	0.25%	Percent reduction in VMT (CAPCOA SDT-2)
Resource Savings	Total VMT Reduction =	1,297,223	VMT per year
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	485	MT CO2e
Municipal Costs and Savings Calculations	Staff time required for review and approval of projects and acquiring grant funding for pedestrian infrastructure.		
	FTE =	0.1	Estimated staff time per year to develop new program
	$/FTE=	70,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$3,500	Dollars (Assumes that grant funding would be used to implement pedestrian infrastructure. Minimal costs would occur as a result of incorporating multi-modal improvements into pavement resurfacing, restriping, and signalization operations (less than $5,000).)
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Community VMT Reduced=	1,297,223	Dollars per year
	Community operating cost per mile =	$0.56	Dollars
	Cost per mile of new sidewalk =	$250,000	Dollars per mile
	Total cost of new bicycle lanes =	$1,250,000	Dollars
Community Costs and Savings	Community Cost =	$0	Dollars per person (Assumes cost would be incurred by the City through grant funding and the private developer.)
	Community Savings =	Varies	Dollars per person (Varies based on number of trips made by foot and distance travelled. Savings of $0.555 per mile.)

Notes

Calculation methodology derived from CAPCOA measure SDT-1

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf
2. Cambridge Systematics. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions (2009). http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendices_Complete_102209.pdf
3. Sacramento Metropolitan Air Quality Management District (SMAQMD) Recommended Guidance for Land Use Emission Reductions. (p.13) http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf

TL-3 Expand Transit Network

Calculation Methodology and Equations

Key Assumptions for Calculations:

Percent Increase in Transit Service	50%	Percent
Staff time needed for this measure	0.02	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	% VMT Reduction = Coverage * Elasticity * Mode* Adjustment (CAPCOA, Strategy TST-3, Page 277)		
	Forecast VMT (2020) =	172,963,018	VMT in 2020
	Coverage =	50%	Percent increase in transit service
	Elasticity =	1.1	Elasticity of transit ridership with respect to service coverage (CAPCOA, Strategy TST-3, Page 277)
	Mode =	2.7%	Existing transit mode share (US Census Bureau)
	Adjustment =	0.67	Adjustments from transit ridership increase to VMT (CAPCOA, Strategy TST-3, Page 277)
	% VMT Reduction =	1.0%	Percent
Resource Savings	Total VMT Reduction due to transit network expansion=	1,720,896	VMT
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	643	MT CO2e
Municipal Costs and Savings Calculations	Staff time required for coordinating with RTA/transit agencies.		
	FTE =	0.02	Estimated staff time per year to develop new program
	$/FTE =	70,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$1,400	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Private costs and savings of increasing transit service, scaled to City population.		
	Private VMT reduced =	1,720,896	VMT
	Private vehicle operating cost =	$0.56	Dollars per mile
	Private savings from avoided driving =	$955,097	Dollars
	Cost of transit fare =	$2	Dollars/day (may vary depening on pass) (SLO RTA)
	City forecast (2020) population =	7,954	People
	Number of people switching to from driving to transit =	79	People
	Private cost from transit fares =	$158	Dollars
Community Costs and Savings	Community Cost =	$520	Dollars
	Community Savings =	$12,069	Dollars

Notes

Calculation methodology derived from CAPCOA measure TST-3.

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. US Census Bureau. 2006-2010 American Community Survey. Data file B08101: Means of Transportation to Work

3. Transit Cooperative Research Program. TCRP Report 95 Traveler Response to System Changes – Chapter 10: Bus Routing and Coverage. 2004. (p. 10-8 to 10-10)

4. SLO RTA - http://www.slorta.org/fares/rta

TL-4 Increase Transit Service Frequency/Speed

Calculation Methodology and Equations

Key Assumptions for Calculations:

Percentage reduction in headways (increase in frequency)	50%	Percent
Bus rapid transit selected? (1 for yes, 0 for no)	1	Yes or No
Staff time needed for this measure	0.02	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	% VMT Reduction = Headway * B * C * Mode * D (CAPCOA, TST-4, Page 281)		
	Forecast VMT (2020) =	172,963,018	VMT
	Headway =	50%	Percent reduction in headways
	B =	0.38	Elasticity of transit ridership with respect to increased frequency of service (CAPCOA, TST-4, Page 283)
	C =	85%	Adjustment for level of implementation (CAPCOA, TST-4, page 281)
	Mode =	2.7%	Existing transit mode share (US Census)
	D =	0.67	Ratio of decreased VMT to increased transit ridership (CAPCOA, TST-4, Page 281)
	% VMT Reduction from Headway=	0.29%	Percent VMT Reduction
	% VMT Reduction from Bus Rapid Transit =	1.00%	Percent VMT Reduciton if selected (from CAPCOA, TST-1, page 272 - 28%*Mode*20%*0.67=1%)
	Total % VMT Reduction	1.29%	Percent VMT Reduction
Resource Savings	Total VMT Reduction due to transit network expansion=	2,234,948	Annual Reduced VMT due to transit frequency improvement
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	835	MT CO2e
Municipal Costs and Savings Calculations	Staff time required for coordinating with RTA/transit agencies.		
	FTE =	0.02	Estimated staff time per year to develop new program
	$/FTE=	70,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$1,400	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Private VMT reduced =	2,234,948	VMT
	Vehicle operating cost per mile =	$0.56	Dollars per mile
	Private savings from avoided driving =	$1,240,396	Dollars
	Cost of transit fare =	$2	Dollars/day (may vary deepening on pass) (SLO RTA)
	City forecast (2020) population =	7,954	People
	Number of people switching to from driving to transit =	23	People
	Private cost from transit fares =	$46	Dollars
Community Costs and Savings	Community Cost =	$520	Dollars
	Community Savings =	$53,378	Dollars

Notes

Calculation methodology derived from CAPCOA measure TST-1 and TST-4.

References

1. Transit Cooperative Research Program. TCRP Report 95 Traveler Response to System Changes – Chapter 9: Transit Scheduling and Frequency (p. 9-14)
2. SLO RTA - http://www.slorta.org/fares/rta
3. US Census Bureau. 2006-2010 American Community Survey. Data file B08101: Means of Transportation to Work

TL-5 Transportation Demand Management (TDM) Program - Voluntary

Calculation Methodology and Equations

Key Assumptions for Calculations:

Targeted percent of employees eligible to participate	20%	Percent
Targeted percent capture of residential commute trips to San Luis Obispo	5%	Percent
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = Forecast Employee Commute VMT x (A x B)		
	Where:		
	Forecast Annual VMT (2020) =	172,963,018	VMT in 2020
	Forecast Annual Employee Commute VMT (2020)=	34,592,604	Employee commute VMT in 2020 (20% of total VMT, Fehr & Peers)
	Percent Reduction in Commute VMT (A) =	5.4%	Percent (CAPCOA, page 220)
	Percent of Employees Participating (B) =	20%	Percent of employees to participate in the TDM program
Resource Savings	VMT reduction from eligible employees=	373,600	
	5% of Commute VMT to San Luis Obispo=	13,000	Average Weekday Daily VMT (Fehr & Peers)
	Conversion from average weekday daily VMT to average annual VMT =	347	Caltrans
	5% of Annual Commute VMT to San Luis Obispo=	4,511,000	Average Annual VMT
	Total VMT Reduction =	4,884,600	VMT in 2020
GHG Emission Reduction Calculations	GHG Reduction = VMT Reduction x Cef		
	Where:		
	Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	1,825	MT CO2e
Municipal Costs and Savings Calculations	Annual staffing costs associated with coordination and marketing.		
	FTE =	0.04	Estimated cost of staff time
	$/FTE =	$70,000	Total annual cost per FTE
Municipal Costs and Savings	Municipal Cost =	$2,800	Dollars
	Municipal Savings =	$0	Dollars
Community Cost and Savings Calculations	Private VMT Reduced =	373,600	VMT
	Private vehicle operating cost per mile =	$0.56	Dollars per mile
	Total community savings =	$207,348	Dollars
	Total employees =	4,500	Employees (projected in 2020)
	Employees participating in TDM =	900	Employees
Community Costs and Savings	Community Cost=	$0	Dollars per employee
	Community Savings=	$230	Dollars per employee

Notes

Calculation methodology derived from CAPCOA measures TRT-7, page 240.

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. Fehr & Peers calculation of countywide VMT associated with employee commute from the San Luis Obispo Council of Governments Regional Traffic Model 2.0, November 2012.

TL-6 Parking Supply Management

Calculation Methodology and Equations

Key Assumptions for Calculations:

Implementation Year	2015	Year
Net reduction in parking spaces	500	Parking Spaces
New parking spaces by 2020 forecast under existing regulations	2,000	Parking Spaces
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = VMT Growth x (((N - O)/O) x 0.5)		
	Baseline VMT (2005) =	112,566,800	Annual Vehicle Miles Traveled (VMT)
	Forecast VMT (2020) =	172,963,018	Annual VMT
	VMT Growth =	20,132,073	VMT generated by forecast development between implementation year and 2020
	N =	1,500	Parking spaces forecast under proposed regulations. (Placeholder value assumes 1,000,000 square feet of new development and 3.5 spaces per 1,000 square feet)
	O=	2,000	Parking forecast under existing regulations. (Placeholder value assumes 1,000,000 square feet of forecast development and 4 spaces per 1,000 square feet)
	P =	0.5	Estimated ratio of reduction in parking supply to reduction in vehicle trips (CAPCOA PDT-1)
	Percent change =	-25%	Percent change in new parking supply
Resource Savings	Annual VMT Reduction =	2,516,509	Annual reduction in VMT (CAPCOA PDT-1)
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where:		
	2020 Composite Emissions Factor Cef=	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	940	MT CO2e
Municipal Costs and Savings Calculations	Staff time to develop policy and establish in-lieu fees.		
	FTE =	0.04	Estimated staff time per year
	$/FTE=	$70,000	FTE cost per year
Municipal Costs and Savings	Municipal Cost =	$2,800	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Private costs and savings of increasing transit service, scaled to City population. Change in private costs = (A*B)+((D*E)/G)		
	Private VMT Reduced (A) =	2,516,509	VMT
	Private vehicle operating cost per mile (B) =	$0.56	Dollars per mile
	Private Savings from avoided driving (C) =	$1,396,663	Dollars
	Reduction in required parking spaces (D) =	500	Reduction in required parking spaces

	Surface parking construction costs (Excludes cost of land) =	$10,000	Dollars per space (U.S. parking structure construction costs are reported to average about $15,000 per space in 2008. Adjusted to reflect cost of ground floor spaces.) (Victoria Transport Policy Institute)
	Total cost savings from reduced parking construction (F) =	$5,000,000	Dollars (This is a savings for the project applicant/developer, not the general public.)
Community Costs and Savings	Community Cost =	$0	Dollars per parking space reduced
	Community Savings =	$2,793	Dollars per parking space reduced (Excludes savings to private developers.)

Notes

Calculation methodology derived from CAPCOA measure PDT-1.

References

1. California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (August 2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. Nelson\Nygaard (2005). Crediting Low-Traffic Developments (p. 16): http://www.montgomeryplanning.org/transportation/documents/TripGenerationAnalysisUsingURBEMIS.pdf

3. SF Bay Area Metropolitan Transportation Commission Parking Code Guidance - http://www.mtc.ca.gov/planning/smart_growth/parking/6-12/Parking_Code_Guidance_June_2012.pdf

4. Victoria Transport Policy Institute - www.vtpi.org/tca/tca0504.pdf

TL-7 Public Parking Pricing

Calculation Methodology and Equations

Key Assumptions for Calculations:

Total public parking spaces where parking pricing would apply	2,000	Parking Spaces
Percentage increase in parking prices	25%	Percent
Staff time needed for this measure	0.25	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = Baseline VMT associated with Public Parking x (P × Epp)		
	Public parking spaces =	2,000	Total number of on- and off-street public parking spaces where parking pricing would apply
	Baseline VMT associated with public parking =	16,656,000	VMT calculated by multiplying public parking spaces by: (a) The number of times a public space "turns over" (e.g. twice per day) (b) The average vehicle trip length times two for inbound and outbound trips (e.g. 6 x 2 = 12 miles) (c)Annual miles are calculated using an annualization factor of 347 to account for reduced weekend and holiday mileage (consistent with California Air Resources Board standard practice).
	P =	25%	Percent increase in parking prices (minimum of 25% increase: Moving Cooler, p. B-10)
	Epp =	0.11	Elasticity of VMT with respect to parking price (Clinch & Kelly)
Resources Savings	Annual VMT Reduction =	458,040	Annual reduction in vehicle miles traveled
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	171	MT CO2e
Municipal Costs and Savings Calculations	New meters and some staff time may be needed to implement the programs. Additional revenue to cover meter and staff costs will be generated due to on-street parking prices. Change in public costs = B -		
	FTE =	0.25	Estimated staff time to develop new program
	$/FTE =	$70,000	Total annual cost per FTE
	Daily revenue per fee parking space =	$6.00	Dollars (Assumes parking cost is $1 per hour and each parking space is occupied 6 hours per day.)
	Total annual municipal revenue from parking fees =	$4,380,000	Dollars
Municipal Costs and Savings	Municipal Cost =	$17,500	Dollars
	Municipal Savings =	$4,310,000	Dollars
Community Costs and Savings Calculations	Private costs increase as drivers pay parking fees. New costs are offset somewhat by reduced driving costs.		
	Private VMT reduced =	458,040	VMT
	Private vehicle operating cost per mile =	$0.56	Private vehicle operating cost per mile
	Private savings from avoided driving =	$254,212	Private savings from avoided driving.
	Increase in parking fees paid =	$4,380,000	Increase in parking fees paid

Community Costs and Savings	Community Cost =	$2,190	Dollars per new paid parking space
	Community Savings =	$127	Dollars per new paid parking space

Notes

Calculation methodology derived from CAPCOA measure PDT-3; users should consult detailed CAPCOA guidance and example calculations when using this methodology.

Where on-street parking is currently above 85% occupancy, market-priced parking will also reduce VMT and congestion by eliminating driver's need to circle for parking. This potential reduction is not accounted for in the above calculations.

References

1. California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (August 2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. Cambridge Systematics. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute. (p. B-10)

3. J. Peter Clinch and J. Andrew Kelly (2003), Temporal Variance Of Revealed Preference On-Street Parking Price Elasticity, Department of Environmental Studies, University College Dublin (www.environmentaleconomics.net)

TL-8 Electric Vehicle Network and Alternative Fueling Stations

Calculation Methodology and Equations

Key Assumptions for Calculations

Percent Adoption of Electric Vehicles Based on Implementation of Comprehensive EV Network	5%	Percent
Staff time needed for this measure	0.08	Full Time Equivalent

Calculations:

GHG Emission Reduction Calculations	GHG reduction = (City Forecast VMT x B) x D		
	City Forecast VMT (2020) =	172,963,018	VMT
	Estimated percent of drivers switching to EV's by 2020 (B) =	5%	Percent
	VMT driven by those shifting to EV's (C) =	8,648,151	VMT
	Default composite emissions factor =	0.000374	MT CO2e per VMT
	Emissions factor for plug-in electric vehicle =	0.000045	MT CO2e per VMT (US DOE)
	Emissions-per mile difference between average car and EV (D) =	0.000329	MT CO2e per VMT
GHG Emission Reduction	Total GHG Savings =	2,842	MT CO2e
Municipal Costs and Savings Calculations	Staff time needed for EV Readiness streamlining and coordination with APCD and Central Coast Clean Cities Coalition. (A specific program of investments has not yet been identified by APCD and the Central Coast Clean Cities Coalition. It is expected that localities would seek outside funds to support investments in EV charging stations and alternative fuel stations.)		
	FTE =	0.1	Estimated staff time to develop new program
	$/FTE =	$70,000	Total annual cost per FTE
Municipal Costs and Savings	Municipal Cost =	$5,600	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Cost of EV charging station =	$8,000	Dollars (Average total cost for commercial charging station including hardware and installation for AC Level 2, 7.5 kW, 240V Charger) (Ready Set Charge California)
Community Costs and Savings	Community Cost =	$0	Dollars per charging station (Assumes cost of EV charging stations would be incurred by private developer. Developer costs may be covered by applicable grants.)
	Community Savings =	$0	Dollars per charging station

Notes

References

1. Argonne National Laboratory. 2009. Multi-Path Transportation Futures Study: Vehicle Characterization and Scenario Analyses. ANL/ESD/09-5. Table 3-11a, p. 53.).
2. "Electric Vehicle Infrastructure, A Guide for Local Governments in Washington State: Model Ordinance, Model Development Regulations, and Guidance Related to Electric Vehicle Infrastructure and Batteries per RCW 47.80.090 and 43.31.970." http://www.psrc.org/assets/4325/EVI_full_report.pdf
3. US Department of Energy (DOE) - http://www.afdc.energy.gov/vehicles/electric_emissions_sources.html
4. Ready, Set, Charge California - A Guide to EV Ready Communities - http://www.rmi.org/Content/Files/Readysetcharge.pdf

TL-9 Smart Growth

Calculation Methodology and Equations

Note: This measure was calculated by Fehr & Peers using the Regional Travel Model

Key Assumptions for Calculations:

Percentage of new residential units located within 0.25 miles of transit by 2020	50%	Percent
Percentage of new jobs located within 0.25 miles of transit by 2020	50%	Percent
Percentage increase from base density for new development	67%	Percent
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

	2020 VMT =	172963017.50	VMT
	% Reduction in VMT	9%	Percent (Fehr & Peers)
Resource Savings	Annual VMT Reduction =	15,566,672	Vehicle miles traveled
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emissions Reduction	Total GHG Savings =	5,816	MT CO2e
Municipal Costs and Savings Calculations	Staff time needed to identify incentives and update codes and regulations.		
	FTE =	0.1	Estimated staff time to develop new program
	$/FTE =	$70,000	Total annual cost per FTE
Municipal Costs and Savings	Municipal Cost =	$3,500	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Private developers will gain from a wider choice of potential development opportunities, costs of which would vary based on the incentives provided.		
	Private VMT reduced =	15,566,672	VMT
	Private vehicle operating cost per mile =	$0.56	Private vehicle operating cost per mile
	Private savings from avoided driving =	$8,639,503	Private savings from avoided driving.
Community Costs and Savings	Community Cost =	Varies	Dollars per unit
	Community Savings =	Varies	Dollars per mile

Notes

CAPCOA measures LUT- (see link below); users should consult detailed CAPCOA guidance and example calculations when using this methodology.

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

3. Nelson\Nygaard, 2005. Crediting Low-Traffic Developments (p.12). Journal of the American Planning Association: http://www.montgomeryplanning.org/transportation/documents/TripGenerationAnalysisUsingURBEMIS.pdf

4. Boarnet, Marlon and Handy, Susan. 2010. "Draft Policy Brief on the Impacts of Residential Density Based on a Review of Empirical Literature."

5. Criteron Planner/Engineers and Fehr & Peers Associates (2001). Index 4D Method. A Quick-Response Method of Estimating Travel Impacts from Land-Use Changes. Technical Memorandum prepared for US EPA, October 2001.

6. TCRP Report 95, Transit Oriented Development Traveler Response to Transportation System Changes, Transit Oriented Development. (p 17-35) http://www.fta.dot.gov/documents/Transit_Oriented_Development_-_Traveler_Response_to_Transportation_System_Changes_TCRP_Report_95.pdf

7. ICLEI CAPPA version 1.5 - Transit Oriented Development tab

O-1 Equipment Upgrades, Retrofits, and Replacements

Calculation Methodology and Equations

Key Assumptions for Calculations:

Is this measure selected in conjunction with Measure 5a - Construction Equipment Efficiency?	No	Yes or No
Percentage of off-road equipment replaced with electric equipment	5%	Percent
Percentage of off-road equipment replaced with alternative fuels	5%	Percent
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

GHG Emission Reduction Calculations	GHG Emissions Reduced = Reduction from Replacement with Electric Equipment + Reduction from Alternative Fuels 1 - GHG Reduced from Replacement with Electric Equipment = Forecast Construction Emissions x Percent Equipment Replaced x (Percent Diesel Equipment x Diesel Reduction) x (Percent Gasoline Equipment x Gasoline Reduction) 2 - GHG Emissions Reduced from Alternative Fuels = Forecast Construction Emissions x Percent Equipment Replaced x (Percent Diesel Equipment X Diesel Reduction) x (Percent Gasoline Equipment x Gasoline Reduction)		
	Total Forecast (2020) Off-Road GHG Emissions =	1,957	MT CO2e
	Forecast (2020) Off-Road GHG Emissions from Construction Equipment =	1,078	MT CO2e
	Percentage GHG Emissions from Diesel Equipment =	90%	Percent
	Percentage GHG Emissions from Gasoline Equipment =	8%	Percent
	Percentage GHG Emissions from Compressed Natural Gas =	2%	Percent
	GHG Reduction from Replacing Diesel Equipment with Electric Equipment =	72.9%	Percent (CAPCOA C-2, page 421)
	GHG Reduction from Replacing Gasoline Equipment with Electric Equipment =	72.4%	Percent (CAPCOA C-2, page 421)
	GHG Reduction from Purchase of Electric Equipment =	70	MT CO2e
	Emission Reduction Due to Fuel Switch from Diesel to Compressed Natural Gas =	18%	Percent (CAPCOA C-1, page 415)
	Emission Reduction Due to Fuel Switch from Gasoline to Compressed Natural Gas =	20%	Percent (CAPCOA C-1, page 415)
	GHG Reduction from Use of Alternative Fuels =	17	MT CO2e
GHG Emission Reduction	Total GHG Reduction =	87	MT CO2e
Municipal Costs and Savings Calculations	Staff time needed to conduct outreach and promotional activities.		
	FTE =	0.05	Estimated staff time per year
	$/FTE =	$70,000	FTE cost per year
Municipal Costs and Savings	Municipal Cost =	$3,500	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings	Community Cost =	$0	Dollars (Assumes equipment replacement and upgrades would be funded through the Carl Moyer program.)

Community Costs and Savings	Community Savings =	Varies	Dollars (Varies based on vehicle/equipment replacement type.)

Notes

If used in conjunction with measure 5a, emissions reductions associated with upgrading construction equipment are removed to avoid double-counting.

Off-Road GHG Emissions were calculated from County-wide data from OFF-ROAD 2007.

Emissions reduction percentages from switching from diesel to compressed natural gas and from gasoline to compressed natural gas were calculated using the averages for all construction equipment type and horsepower categories for 2020 Tables in CAPCOA, C-1.

References

1. California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (August 2010): C-1, C-2, C-3
2. California Air Resources Board (ARB). Off-road Emissions Inventory. OFFROAD2007

S-1 Solid Waste Diversion

Calculation Methodology and Equations

Key Assumptions for Example Calculations:

Target additional diversion rate (2020)	30%	Percent
Estimated staff time needed for this measure	0.08	Full Time Employee (FTE)

Calculations:

Resource Savings Calculations	Tons Diverted = Future Year Landfilled Tonnage x Future Year Diversion Rate 1 - Future Year Landfilled Tonnage = (1 + CAGR)^15 x Baseline Year Landfilled Solid Waste		
	Baseline Year (2005) Landfilled Solid Waste (Community-Wide) =	11,921	Tons
	Baseline Year (2005) GHG Emissions from Landfilled Solid Waste =	3,479	MT CO2e
	Projected (2020) GHG Emissions from Landfilled Solid Waste =	3,024	MT CO2e
	Compound Annual Growth Rate (CAGR) =	-0.53%	Percent
	Total City Future Year (2020) Solid Waste Tonnage =	10,362	Tons
	Paper Products =	21.0%	Percent
	Food Waste =	14.6%	Percent
	Plant Debris =	6.9%	Percent
	Wood/Textiles =	21.8%	Percent
	All Other Waste =	35.7%	Percent
	Future Year Paper Products =	2,176	Tons
	Future Year Food Waste =	1,513	Tons
	Future Year Plant Debris =	715	Tons
	Future Year Wood/Textiles =	2,259	Tons
	Future Year All Other Waste =	3,699	Tons
	Paper Products Diverted =	653	Tons
	Food Waste Diverted =	454	Tons
	Plant Debris Diverted =	214	Tons
	Wood/Textiles Diverted =	678	Tons
	All Other Waste Diverted =	1,110	Tons
Resource Savings	Future Year Total Waste Diverted =	3,109	Tons
	Total MT CO2e Diverted = (2.138)(Paper Products)(0.9072) + (1.120)(Food Waste)(0.9072) + (0.686)(Plant Debris)(0.9072) + (0.605)(Wood/Textiles)(0.9072) + (0.00)(All Other Waste)(0.9072) 1 - Emission Reduction Per Waste Category = Emissions Factor for Category x Future Year Category Tonnage Diverted x 0.9072 x (1 - Emissions captured at landfill)		
	0.9072	= Conversion from short tons to metric tons	
	Emission Factor - Paper Products =	2.138	MT CO2e / MT waste

GHG Emission Reduction Calculations	Emission Factor - Food Waste =	1.210	MT CO2e / MT waste
	Emissions Factor - Plant Debris =	0.686	MT CO2e / MT waste
	Emission Factor - Wood/Textiles =	0.605	MT CO2e / MT waste
	Emission Factor - All Other Waste =	0.000	MT CO2e / MT waste
	Emissions from Paper Products =	1,266	MT CO2e
	Emissions from Food Waste =	498	MT CO2e
	Emissions from Plant Debris =	133	MT CO2e
	Emissions from Wood/Textiles =	372	MT CO2e
	Emissions from All Other Waste =	0	MT CO2e
	Emissions captured at landfill =	60%	Percent
GHG Emission Reduction	Total GHG Emissions Reductions =	908	MT CO2e
Municipal Costs and Savings Calculations	Cost may include additional staff time.		
	FTE =	0.1	Estimated staff time per year
	$/FTE =	$70,000	FTE cost per year
Municipal Costs and Savings	Municipal Costs=	$5,600	Dollars
	Municipal Savings=	$0	Dollars
Community Costs and Savings	Community Costs =	$0	Dollars
	Community Savings =	$0	Dollars

Notes

Note: In 2012, the City's diversion rate was 71%.

All cities are assumed to have a baseline year diversion rate of 50%. This diversion has already been accounted for in the baseline year landfilled solid waste tonnage.

CAGR growth rates were calculated based on population growth.

ICLEI's CACP software incorporates emission factors for the diversion of certain materials from the waste stream, derived from the EPA WARM model.

GHG Emissions Calculations assume a landfill methane recovery rate of 60%.

References

1. DRAFT City of Stockton Climate Action Plan (February 2012) - pg. C-77,C-78
2. Hayward Climate Action Plan (October, 2009) - pg. 170
3. County of San Bernardino Greenhouse Gas Emissions Reduction Plan (September 2011) - pg. 91
4. EPA's Waste Reduction Model (WARM), available at: http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html
5. ICELI's Clean Air Climate Protection (CACP) Software (for members), available at: http://www.icleiusa.org/action-center/tools/cacp-software

T-1 Tree Planting Program

Calculation Methodology and Equations

Note: There is no reduction in GHG emissions associated with preservation of existing trees or mitigation of trees removed.

Key Assumptions for Calculations:

Target number of trees planted (net new trees)	1,000	Trees
City subsidy of tree cost and planting	25%	Percent Subsidized by City
Cost per tree	$60	Dollars per Tree
Staff time needed for this measure	0.08	Full Time Equivalent (FTE)

Calculations:

GHG Emission Reduction Calculations	GHG Emissions Reduction=Number of Trees Planted x Carbon Sequestration Rate		
	0.0121	= Average carbon sequestration rate (MT CO_2/Tree)	
	1000	= Number of Trees Planted	
GHG Emission Reduction	Total GHG Emissions Reduced =	12	MT CO2e
Municipal Costs and Savings Calculations	Cost per tree =	$60	Dollars/tree (McPherson, et al)
	City subsidy of tree cost and planting =	25%	Percent subsidized
	City cost per tree =	$15	Dollars per tree
	Total capital cost=	$15,000	Dollars
	FTE =	0.08	Estimated staff time to develop program
	$/FTE	$70,000	FTE cost per year
	Cost of staff time =	$5,600	Dollars
Municipal Costs and Savings	Municipal Cost =	$20,600	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Capital cost = (cost per tree x number of trees planted x percentage of city subsidy)		
	Where:		
	Community cost per tree =	$45	Dollars/tree
	Number of trees planted =	1,000	Trees
	Total tree capital cost (for community)=	$45,000	Dollars
	Maintenance cost = maintenance cost per tree x number of trees planted. (Assumes community covers all maintenance costs.)		
	Maintenance cost=	$34	Dollars/tree (McPherson, et al)
	Total maintenance cost (for community) =	$34,000	Dollars
Community Costs and Savings	Community Cost =	$79	Dollars per tree
	Community Savings =	$0	Dollars per tree

Notes

Carbon sequestration rate from CAPCOA Quantifying GHG Mitigation Measures Report p. 403. There is no reduction in GHG emissions associated with preservation of existing trees or mitigation of trees removed. Account for net new trees only.

References

1. California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (August 2010) - pg. 403

2. McPherson, et al as cited in Stockton Draft CAP - http://www.stocktongov.com/government/boardcom/clim.html

State Measures - Quantification Details

Measure Title	2020 Reduction (MT CO_2e)	Assumptions
Clean Car Standards, AB 1493 (Pavley I)	10,995	CARB anticipates that the Pavley I standard will reduce GHG emissions from new California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016. Reductions in GHG emissions from the Pavley I standard were calculated using CARB's EMFAC2011 model for San Luis Obispo County. To account for this standard, EMFAC2011 integrates the reductions into the mobile source emissions portion of its model (CARB, 2013).
Low Carbon Fuel Standard	On-Road: 7,180 Off-Road: 218	The Low Carbon Fuel Standard (LCFS) requires a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. Reductions in GHG emissions from LCFS were calculated using CARB's EMFAC2011 model for San Luis Obispo County. To account for this standard, EMFAC2011 integrates the reductions into the mobile source emissions portion of its model (CARB, 2013).
Title 24	423	The California Energy Commission (CEC) estimates that the 2008 standards reduce consumption by 10 percent for residential buildings and 5 percent for commercial buildings, relative to the previous standards. For projects implemented after January 1, 2014, the CEC estimates that the 2013 Title 24 energy efficiency standards will reduce consumption by 25 percent for residential buildings and 30 percent for commercial buildings, relative to the 2008 standards. These percentage savings relate to heating, cooling, lighting, and water heating only and do not include other appliances, outdoor lighting that is not attached to buildings, plug loads, or other energy uses. Therefore, these percentage savings were applied to the percentage of energy use covered by Title 24. The calculations and 2020 GHG emissions forecast assume that all growth in the residential and commercial/industrial sectors is from new construction (CEC, 2008; Statewide Energy Efficiency Collaborative, 2011).
Renewable Portfolio Standard	5,961	PG&E must have a renewable portfolio of 33% by 2020. In order to calculate future emissions that take into account the Renewable Portfolio Standard, PG&E's 2020 emissions factor was applied (PG&E, 2011).

Existing Local Measures – Quantification Details

Emissions Category	Measure Title	Detailed Description	Actual Measure	Emissions Reduction in 2020 (MTCO2e)	Measure Source	GHG Calculation Methodology Source	Activity Data	Units	Assumptions	Data Sources
Energy (Community)	Solar Energy Installations (Commercial)	Since 2005, 24 kW of solar photovoltaic and hot water systems have been installed on commercial properties in Pismo Beach. Many of these installations utilized rebates offered through the California Solar Initiative (CSI), a solar rebate program for California consumers that are customers of the investor-owned utilities, such as PG&E. The CSI program is a key component of the Go Solar California campaign for California.	24 kW of solar installed	-6	California Solar Initiative	CAPCOA AE-2	45,600	kWh	Use 1,900 to convert CEC rating to kWh	Solar Capacity from CA Solar (CEC PTC Rating); Conversion factor from US DOE
Energy (Community)	Solar Energy Installations (Residential)	Since 2005, 60 kW of solar photovoltaic and hot water systems have been installed on residential properties in Pismo Beach. Many of these installations utilized rebates offered through the California Solar	60 kW of solar installed	-15	California Solar Initiative	CAPCOA AE-2	113,278	kWh	Use 1,900 to convert CEC rating to kWh	Solar Capacity from CA Solar (CEC PTC Rating); Conversion factor from US DOE

Emissions Category	Measure Title	Detailed Description	Actual Measure	Emissions Reduction in 2020 (MTCO2e)	Measure Source	GHG Calculation Methodology Source	Activity Data	Units	Assumptions	Data Sources
		Initiative (CSI), a solar rebate program for California consumers that are customers of the investor-owned utilities, such as PG&E. The CSI program is a key component of the Go Solar California campaign for California.								
Energy (Municipal)	Energy Efficient Street Lights	The City completed a LED retrofit project which will replace 17 Cobrahead Streetlights and the 27 two head decorative streetlights in the downtown core. It is estimated that the change from conventional high pressure sodium lights to LED's will save the City over $4,000 in energy costs per year.	71 metal halide streetlights to LED	-6	City memo	CAPCOA LE-1	43,460	kWh	Assumes Watt rating of bulbs fell from 200 to 50. Assumes streetlights operate 4,100 hrs/yr.	U.S. Department of Energy U.S. Lighting Market Characterization
Energy (Municipal)	Energy Efficient Traffic Signal Lights	Convert existing signals to LED lights to reduce operational costs. $48,000 budgeted	6 traffic signals (18 lights)	-1	Capital Improvement Program	CAPCOA LE-3	7,096	kWh	Assumes Watt rating of bulbs fell from 150 to 15. Assumes traffic signals operate 8,760 hrs/yr.	Consortium for Energy Efficiency

Emissions Category	Measure Title	Detailed Description	Actual Measure	Emissions Reduction in 2020 (MTCO2e)	Measure Source	GHG Calculation Methodology Source	Activity Data	Units	Assumptions	Data Sources
Energy (Municipal)	Energy Efficiency	City Hall and Bello Vets Hall HVAC Replacement (2 units)	7,200 kWh	-1			7,200	kWh		
Transportation and Land Use	4th Street widening and sidewalk improvements	Pave curb, gutter, and sidewalk along Pismo Lake Reserve and the opposite side of 4th Street.	1/2 mile segment	-4	Capital Improvement Program	CAPCOA SDT-1	11,406	VMT	0.5 mile improvement, 12,500 ADT	ADT from California Department of Public Health Traffic Volume Linkage Tool
Transportation and Land Use	Price Street sidewalk at Dinosaur Caves Park	Construct sidewalk along park frontage	1/5 mile segment	-0.4	Capital Improvement Program	CAPCOA SDT-1	1,328	VMT	0.2 mile improvement, 3,830 ADT	ADT from California Department of Public Health Traffic Volume Linkage Tool
Water	Water Conservation Programs to Meet SB 7 Target	Implementation of programs identified in the City's Urban Water Management Plan to reduce per capita water consumption by 20% consistent with SBx7-7. According to the Plan, programs will result in 131,304,370 of water savings in 2020.	131,304,370 of water savings	-23	Urban water management plan	CAPCOA WUW-2	131,304,370	Gallons	Assumes 1,300 kWh/million gallons electricity required to supply, treat, and distribute water. Assumes 0.133 MT CO2e/MWh electricity.	Urban Water Management Plan (September, 2011), CAPCOA WSW-2 (pg. 337), California Energy Commission Refining Estimates of Water-Related Energy Use in California (December 2006)
Waste (Community)	Green Waste Diversion	The City collects greenwaste	Unknown commitment	Not quantified		CAPCOA SW-1				
Waste (Community)	Construction and Demolition Debris Diversion	As of 2010, the California Green Building Standards Code (CalGreen) requires that 50% of non-hazardous construction and demolition debris be	50% diversion of construction and demolition debris	-186	California Green Building Standards Code	CAPCOA p. 43; SW-2	-		According to the California 2008 Statewide Waste Characterization Study, construction and demolition debris makes up 29% of	California 2008 Statewide Waste Characterization Study

Emissions Category	Measure Title	Detailed Description	Actual Measure	Emissions Reduction in 2020 (MTCO2e)	Measure Source	GHG Calculation Methodology Source	Activity Data	Units	Assumptions	Data Sources
		recycled or reused.							the waste stream and 40% of that is non-hazardous and recyclable.	

APPENDIX C

CAP CONSISTENCY WORKSHEET

CAP Consistency Worksheet

The City of Pismo Beach CAP was developed to comprehensively analyze and mitigate the significant effects of GHG emissions consistent with CEQA Guidelines Section 15183.5(b) and to support the State's efforts to reduce GHG emissions under Executive Order S-3-05 and AB 32 (see CAP Chapter 1, Sections 1.1 and 1.4). Pursuant to CEQA Guidelines Sections 15064(h)(3) and 15130(d), if a project is consistent and complies with the requirements of an adopted plan, such as a CAP, that includes the attributes specified in CEQA Guidelines Section 15183.5(h), the lead agency may determine that the project's GHG impacts are less than significant with no further analysis required. This appendix sets forth a CAP consistency worksheet that an applicant may use to demonstrate project compliance with the CAP. This checklist should be filled out for each new project, subject to discretionary review of the City of Pismo Beach.

To determine project consistency and compliance with the CAP, the applicant should complete Sections A and B below, providing project-level details in the space provided. Generally, only projects that are consistent with the General Plan land use designations, and SLOCOG population and employment projections, upon which the GHG emissions modeling and CAP is based, can apply for a determination of consistency with the CAP. In addition, all mandatory actions identified in Section B must be incorporated as binding and enforceable components of the project for it to be found consistent with the CAP. If an action is not applicable to the proposed project, please identify and explain.

At this time, the voluntary actions are not required for project consistency with the CAP; however, if a project does include voluntary actions identified in Section B, project-level details should be described to help the City track implementation of voluntary CAP actions that would contribute to Pismo Beach's achievement of its GHG emissions reduction target.

If the project cannot meet one or more of the mandatory actions, substitutions (preferably starting with the voluntary actions) may be allowed if the applicant can demonstrate how substituted actions would achieve equivalent reductions to the City's satisfaction. The applicant would also be required to demonstrate that the project would not substantially interfere with implementation of the mandatory CAP actions.

If it is determined that a proposed project is not consistent with the CAP, further analysis would be required and the applicant would be required to demonstrate that the proposed project's GHG emissions fall below the APCD's adopted GHG significance thresholds (see CAP Chapter 1, Section 1.8.3, and **Table 1-2**). The project would also be required to demonstrate that it would not substantially interfere with implementation of the CAP.

A. PROJECT INFORMATION

Date:	
Project Name:	
Project Address:	
Project Type:	
Project Size:	
Land Use Designation(s):	
Zoning Designation(s):	
Project Service Population (Residents + Employees):	
Brief Project Description:	
Compliance Checklist Prepared By:	

B. CAP COMPLIANCE WORKSHEET

Measure	Project Actions	Mandatory or Voluntary	Project Compliance (Yes/No/NA)	Details of Compliance*
Energy				
Measure E-4: Incentives for Exceeding Title 24 Energy Efficiency Building Standards	Does the project exceed 2013 Title 24 Building Energy Efficiency Standards?	Voluntary		
Measure E-5: Small-Scale On-Site Solar PV Incentive Program	Does the project include installation of small-scale on-site solar PV systems and/or solar hot water heaters? If so, what type and how much renewable energy would be generated?	Voluntary		
Measure E-6: Income-Qualified Solar PV Program	Does the project include installation of small-scale on-site solar PV systems and/or solar hot water heaters on income-qualified housing units? If so, what type and how much renewable energy would be generated?	Voluntary		
Transportation and Land Use				
Measure TL-1: Bicycle Network	For subdivisions and large developments, does the project incorporate bicycle lanes, routes, and/or shared-use paths into street systems, as currently required by the General Plan and Municipal Code, to provide a continuous network of routes, facilitated with markings, signage, and bicycle	Mandatory		

Measure	Project Actions	Mandatory or Voluntary	Project Compliance (Yes/No/NA)	Details of Compliance*
	parking?			
	For non-residential development, does the project comply with mandatory California Green Building Standards Code bicycle parking standards?	Mandatory		
	Does the project incorporate bicycle facilities and/or amenities beyond those required?	Voluntary		
Measure TL-2: Pedestrian Network	Does the project provide a pedestrian access network that internally links all uses and connects all existing or planned external streets and pedestrian facilities contiguous with the project site, as currently required by the General Plan and Municipal Code?	Mandatory		
	Does project minimize barriers to pedestrian access and interconnectivity, as currently required by the General Plan and Municipal Code?	Mandatory		
	Does the project implement traffic calming improvements as appropriate (e.g., marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, median islands, mini-circles, tight corner radii, etc.), as currently required by	Mandatory		

Measure	Project Actions	Mandatory or Voluntary	Project Compliance (Yes/No/NA)	Details of Compliance*
	the General Plan and Municipal Code?			
	Does the project incorporate pedestrian facilities and/or amenities beyond those required?	Voluntary		
Measure TL-3: Expand Transit Network	Does the project provide safe and convenient access to public transit within and/or contiguous to the project area as currently required by the General Plan and Municipal Code?	Mandatory		
Measure TL-6: Parking Supply Management	Does the project include a reduced number of parking spaces or utilize shared parking?	Voluntary		
Measure TL-8: Electric Vehicle Network and Alternative Fueling Stations	Does the project include the installation of electric or other alternative fueling stations?	Voluntary		
Measure TL-9: Smart Growth	Is the project consistent with the City's adopted land use and zoning map?	Mandatory		
	Does the project include any "smart growth" techniques, such as mixed-use, higher density, and/or infill development near existing or planned transit routes, in existing community centers/downtowns, and/or in other designated areas?	Voluntary		
Off-Road				
Measure O-1: Off-Road Equipment	If the project involves construction or demolition, does equipment	Voluntary		

Measure	Project Actions	Mandatory or Voluntary	Project Compliance (Yes/No/NA)	Details of Compliance*
Upgrades, Retrofits, and Replacements	utilize low- or zero-emissions vehicles or equipment?			
Solid Waste				
Measure S-1: Solid Waste Diversion	Does the project provide receptacles for the collection of organic waste?	Voluntary		
	Does the project include composting facilities?	Voluntary		
Tree Planting				
Measure T-1: Tree Planting Program	Does the project include the planting of native and drought-tolerant trees beyond those required as mitigation for tree removal? If so, how many?	Voluntary		

*Please attach additional pages as needed to complete the description and provide project details.